S. HRG. 99-209

NUCLEAR REGULATORY REFORM

HEARINGS

BEFORE THE

SUBCOMMITTEE ON NUCLEAR REGULATION

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

NINETY-NINTH CONGRESS

FIRST SESSION

ON

S. 16

A BILL ENTITLED THE "NATIONAL NUCLEAR POWERPLANT PERSONNEL TRAINING ACT OF 1985"

AND

S. 836

A BILL TO AMEND THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, TO IMPROVE THE NUCLEAR POWERPLANT SITING AND LICENSING PROCESS, AND FOR OTHER PURPOSES

JUNE 27 AND JULY 11, 1985

Printed for the use of the Committee on Environment and Public Works

U.S. GOVERNMENT PRINTING OFFICE
50-661 O
WASHINGTON : 1985

S321-32

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ROBERT T. STAFFORD, Vermont, *Chairman*

JOHN H. CHAFEE, Rhode Island
ALAN K. SIMPSON, Wyoming
JAMES ABDNOR, South Dakota
STEVE SYMMS, Idaho
GORDON J. HUMPHREY, New Hampshire
PETE V. DOMENICI, New Mexico
DAVE DURENBERGER, Minnesota

LLOYD BENTSEN, Texas
QUENTIN N. BURDICK, North Dakota
GARY HART, Colorado
DANIEL PATRICK MOYNIHAN, New York
GEORGE J. MITCHELL, Maine
MAX BAUCUS, Montana
FRANK R. LAUTENBERG, New Jersey

BAILEY GUARD, *Staff Director*
LEE O. FULLER, *Minority Staff Director*

SUBCOMMITTEE ON NUCLEAR REGULATION

ALAN K. SIMPSON, Wyoming, *Chairman*

PETE V. DOMENICI, New Mexico
STEVE SYMMS, Idaho

GARY HART, Colorado
DANIEL PATRICK MOYNIHAN, New York

CONTENTS

JUNE 27, 1985

OPENING STATEMENTS

Page
Moynihan, Hon. Daniel Patrick, U.S. Senator from the State of New York 2
Simpson, Hon. Alan K., U.S. Senator from the State of Wyoming 1

WITNESSES

Ahearne, John F., vice president, Resources for the Future 6
  Written statement 47
  Responses to additional questions 59
Carroll, John E., vice president, training (retired), United Air Lines 32
  Written statement 183
  Responses to additional questions 188
Kanter, Manuel A., Argonne National Laboratories 39
  Written statement 191
  Responses to additional questions 195
Pate, Zack T., president and chief executive officer, Institute of Nuclear Power Operations 25
  Written statement 126
  Comments on S. 16 142
  Responses to additional questions 146
Pigford, Thomas, professor of nuclear engineering, University of California, Berkeley 11
  Written statement 82
  Responses to additional questions 88
Remick, Forrest J., associate vice president, Pennsylvania State University 29
  Written statement 165
  Responses to additional questions 173
Rogovin, Mitchell; Rogovin, Huge & Lenzner 8
  Written statement 63
  Comments on S. 16 74
  Responses to additional questions 76
Smith, Sherwood H., Jr., chairman, president, and chief executive officer, Carolina Power & Light 18
  Written statement 91
  Comments on S. 16 111
  Responses to additional questions 114
Weaver, Lynn, dean, School of Engineering, Auburn University 42
  Written statement 197
  Comments on S. 16 198
  Responses to additional questions 199
Additional material:
  S. 16 201
  S. 836 210

JULY 11, 1985, (p. 229)

OPENING STATEMENTS

Moynihan, Hon. Daniel Patrick, U.S. Senator from the State of New York 230
Simpson, Hon. Alan K., U.S. Senator from the State of Wyoming 229

WITNESSES

Page
Asselstine, James K., Commissioner, Nuclear Regulatory Commission 233
    Written statement 290
Behnke, Wallace B., vice chairman, Commonwealth Edison Electric Co. 260
    Written statement 371
Bernthal, Frederick M., Commissioner, Nuclear Regulatory Commission 236
Brewer, Shelby, vice president, Combustion Engineering, Inc 249
    Written statement 322
Cowan, Barton Z., chairman, Lawyers Committee, the Atomic Industrial Forum 262
    Written statement 387
    Comments on letter from Commissioner Asselstine to Senator Simpson 413
Davis, Kenneth W., consultant, Bechtel Power Corp 250
    Written statement 344
Faden, Micheal E., legislative counsel, Union of Concerned Scientists 262
    Written statement 432
Jones, Hon. Grant, chairman, finance committee, Texas State Senate, accompanied by Patrick J. Raffaniello, director, Southwest Regional Energy Council 268
    Written statement 444
Moore, James, vice president, Westinghouse Electric Corp 247
    Written statement 305
Palladino, Nunzio J., Chairman, Nuclear Regulatory Commission 231
    Written statement 273
Ramey, James T., vice president, Stone & Webster Engineering 249
    Written statement 352
Vaughan, James W., Acting Assistant Secretary for Nuclear Energy, Department of Energy, accompanied by William H. Mellor, Deputy General Counsel for Legislation and Regulations 257
    Written statement 358
Wolfe, Bertram, vice president, General Electric Corp. 245
    Written statement 294
Zech, Lando W., Jr., Commissioner, Nuclear Regulatory Commission 237

STATEMENTS SUBMITTED FOR THE RECORD

Babbitt, Hon. Bruce, Governor, State of Arizona 457
American Public Power Association 461
American Technical Institute 465
Chamber of Commerce of the United States 472
PowerSafety International 482

COMMENTS ON S. 16

Arizona, University of:
    Robert L. Seale, Department of Nuclear and Energy Engineering 483
Howard University:
    George A. Ferguson, Nuclear Engineering Program 485
Illinois, University of:
    George H. Miley, Fusion Studies Laboratory 486
Iowa State University:
    Bernard I. Spinrad, Department of Nuclear Engineering 487
Lowell, University of:
    James P. Phelps, Mechanical and Engineering Department 489
Missouri, University of:
    Nick Tsoulfanisis, Nuclear Engineering 491
Rensselaer Polytechnic Institute:
    R.T. Lahey, Jr., Department of Nuclear Engineering 492
Tennessee, University of:
    P.F. Pasqua, Nuclear Engineering Department 499
Texas A & M University:
    Carl A. Erdman Department of Nuclear Engineering 501
American Nuclear Energy Council 502
Atomic Industrial Forum, Inc 504
Doub and Muntzing 506
Edison Institute 508
Northeast Utilities 510

NUCLEAR REGULATORY REFORM

THURSDAY, JUNE 27, 1985

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON NUCLEAR REGULATION,
Washington, DC.

The subcommittee met at 10 a.m., in room SD-406, Dirksen Senate Office Building, Hon. Alan K. Simpson (chairman of the subcommittee) presiding.

Present: Senators Simpson and Moynihan.

OPENING STATEMENT OF HON. ALAN K. SIMPSON, U.S. SENATOR FROM THE STATE OF WYOMING

Senator SIMPSON. Good morning. The subcommittee meets today to consider the subject of reactor operator training and education—where we stand in our current efforts to respond to the shortcomings that were well identified following the Three Mile Island accident, whether those efforts have been effective in improving training and education of reactor operators, and what additional actions, if any, are necessary to continue demonstrated progress in this area.

Now pending before the subcommittee on the subject of our efforts here is a proposal introduced by my fine colleague and fellow member of the subcommittee, Senator Pat Moynihan, which is entitled "The National Nuclear Powerplant Personnel Training Act."

I certainly commend Senator Moynihan for the very thoughtful attention he has given to the training and education issue and many other issues he and I have worked on since even before I was chairman of this subcommittee.

I look forward to hearing the views of various witnesses at this morning's hearing on this bill and on the broader subject of reactor operator training and education.

I would welcome back those who have appeared before this subcommittee in times past, like you, John Ahearne. Indeed, when I was ranking member. you were here few times. And you, Mr. Rogovin, and your fine work with your Commission. You were here in different capacities then, than today. Yet your background and interest, all of you, and yours, Dr. Pigford, means you have much to share with us.

I want to express my appreciation to all of you who have agreed to testify, including those on the next panel, on this important subject.

I do approach the subject of reactor operator training and Senator Moynihan's proposal with complete openness. I feel we need to have an inquiry here. I am impressed by the progress we have made in this area since the Three Mile Island accident, and in particular by the efforts of the Institute of Nuclear Power Operations. Without that organization, in my mind, the industry would have been in deeper trouble. I think it has been a success story in the nuclear industry, and it should be commended.

On the other hand, I am very willing to consider whether additional steps need to be taken to improve further education and training of reactor operator personnel, and in particular to consider the merits of a Federal training academy. So in that regard, I would hope we will have some good information to judge today.

I do intend to pursue the standardization proposals that have been submitted by NRC and DOE. We may try to shepherd those two related issues along on parallel tracks.

We learned from the French—we often learn things from the French—our ability to provide for uniform standardized training of reactor operators I think is directly related to the degree of standardization in plant design. Accordingly, we will then reschedule those hearings that were scheduled for yesterday. I apologize to some who were discommoded there. We will have that hearing after the Fourth of July in order that we will be in a position to move forward on those two proposals at the same time.

On both issues I look forward to working with all of my colleagues on the subcommittee and full committee, and particularly in this instance Senator Moynihan, as we work to build a consensus.

With that, I am going to turn the hearing over to Senator Moynihan. Senator Thurmond has put out the call, we are having a quorum call in the Judiciary Committee on the Bradford Reynolds nomination. I must go there.

I have complete confidence in you, sir, and you may take the hammer.

Senator MOYNIHAN. Do you think I can operate this hammer?

Senator SIMPSON. Trying to get in training for 1986, are you? Is that it? I will return. Thank you.

Senator MOYNIHAN. Thank you. You knew yesterday this was likely to happen, and indeed it has happened.

Senator SIMPSON. Thank you very much.

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator MOYNIHAN [presiding]. I would like to take up from the chairman's opening remarks and add a few extensions in the context that he was addressing us.

The first is to say that it is not the easiest thing for a group of laypersons, such as we on this committee, to try to deal intelligently and with some consequence with the range of issues such as are presented by nuclear power. We are none of us scientists. We have at most a very lightly sketched understanding of the issues we are dealing with. Yet it is a condition that is presented to us; a condition not different from that which persons in the modern world frequently find themselves in.

We did have for a period of time a scientist in the Senate, the distinguished Senator from New Mexico, who was a geologist and astronaut. He and I used to have colloquy sometimes on a Monday morning when the Senate wasn't busy. I would remark that he was the first natural scientist to serve in the Senate since Thomas Jefferson presided as Vice President. We are a body of lawyers in the main, and in the main rich lawyers. So our knowledge of science is very limited.

On the other hand, we aren't without some experience in the world and we try to cope with it. What we are trying to deal with right now is the fact that the nuclear industry could be doomed in this country. Part of it is a problem of design, the kind of problem that the chairman referred to. It is kind of characteristic of the French to pick one design in Paris and have it replicated everywhere. It has caused advances in the state of the art to the degree that you know what you are dealing with and the uniformity of practice.

You may have seen The New York Times this morning, the front page, the lead-off story, that the Shoreham unit of the Long Island Lighting Company has been, in effect, disallowed $1.35 billion in the design of the Shoreham plant on the grounds they did it wrong, that is all. The first thing they did wrong was auxiliary generators designed as required by NRC for emergency cooling arrangements. And again, they picked a novel design because that has been our pattern, and it is part of our problem.

The second concern I have, and I guess it is a particular concern that I have pursued here—and I will stop talking in a minute, be patient with me—is what I am going to call, with the temerity of the temporary chairman and the knowledge that no one is going to write about this in the newspapers anyway, I am going to call the workplace sociology of the nuclear plant.

This all came about in my mind when we had the Kemeny Commission reporting to us after Three Mile Island. I was a junior member of the subcommittee, and by the time it came to me to ask any questions, the most intelligent questions obviously had been asked, or the ones I found intelligible. So I almost randomly asked the president and chief executive officer, "Tell me, how much money does the fellow who was in charge of that reactor that night, how much money does he make a year?" And the scene was out of one of those Peter Sellers movies. The chairman turns to the person behind him, who turns to the person behind him, and so on, and way in the back of the room a fellow whispered and like so many dominoes the heads turned and the information made its way up. It turns out he made $28,000 a year, or something like that.

It occurred to me that what had happened was that the utilities had taken the workplace definitions of the old fossil fuel plants and transferred them to this new setting, and without any disrespect of any kind, they had declared these to be blue collar jobs. They are blue collar jobs which, among other things, in American workplace stratification and organization, there are these things. Don't suppose because there are large words for them they aren't referring to some realities. A blue collar person is by definition someone apart from management and never rises to management. Every so often, on rare occasions, this will happen. Indeed, when it does, it is something of great notice.

Our military, for example, is divided into two groups of people. One goes in at 19 in the Navy and if they stay in 20 years, they can hope to be a Warrant Officer maybe. In the other, they go in and can hope to be a Commodore. But the person at a bottom post can never be a Commodore. That is understood. Very rarely except perhaps during wartime are there promotions.

But we separate people. We define one as enlisted and the other as officers. They don't meet, they don't talk, don't drink the same thing, marry the same women, have the same salaries. They are permanently separated. That is much more in our society than we think.

I visited a number of nuclear plants and would go through a proper sort of trooping of the guard when you arrived at the, at the pit head, you might say, and were inspected to make sure you didn't have any revolvers on you or any other such matters. They would put you through detectors and up and down. These very snappy people in brass buttons and uniforms would check you out and make sure you were not going to sabotage the plant. Then you got into the plant.

In the plant you found people who didn't look like it was clear in their heads that they could make a decision in 10 minutes, right or wrong, that might lead to the survival of western Pennsylvania, at the high end of the scale, or the bankruptcy of their corporation, at the low end of the scale.

We were going to be a heavy nuclear nation 20 years ago. It looks like we might have come to the end of the whole process, which does not mean we have come to the need for new power sources. But that is a much larger purpose, and I have talked much longer than I intended.

The point here is, as you know, should we try to introduce some uniform training to the operators of our plants, redefine their work, define it as professional in a sense, define it as work that requires something more than the limited understanding of how and what to do from a breaking manual, and put them in a different career track and enlarge both their knowledge and capability and their horizons.

We learned, of course, immediately after TMI, the industry itself responded and created the INPO, to use the seemingly necessary acronym, the Institute for Nuclear Power Operations.

That is enough from me. I would like to hear from you. There aren't going to be any other Senators here. What you say is going to be read with great care. We are taking this matter on seriously. We are seriously considering the Kemeny Commission proposal about a single regulator at the NRC. We have a feeling this thing isn't working. We are going to grope for better management understandings, which we are not that bad at, and scientific judgments, on which we are very weak but we are open to good advice.

I have a written statement that I will include in the record at this point.

[The statement follows:]

Opening Statement of Hon. Daniel Patrick Moynihan, U.S. Senator From the State of New York

I welcome the many witnesses of broad and deep experience here today to discuss the training of nuclear power plant personnel, and my modest proposal for improving such—S. 16, the National Nuclear Power Plant Personnel Training Act of 1985.

I was a member of this Subcommittee, along with Senators Simpson, Hart and Domenici, at the time of the accident at Three Mile Island. I remember well the hearings we held thereafter. The initial shock of the accident had passed, and after a series of technical questions from other members, I asked a simple question: how much money did the operators in the control room earn?

There was a flurry of whispers among the witnesses who were that day before us, with one staff member consulting another, before we got an answer. Not very much.

I figured, for not very much money, you got personnel with not very much training. The balance of the testimony only confirmed this; so too a visit to a nuclear plant to see for myself.

Nuclear reactor operators are much like commercial airline pilots. For the most part their duties are routine, but on occasion they must respond quickly and correctly to unusual or unpredicted circumstances. What I saw did not much resemble the flight deck of a Boeing 747, or something out of the nuclear Navy. I came away convinced that what we need for safe nuclear power is, among other things, well-trained, professional staff. We clearly had a long way to go.

Since then, the nuclear utilities have spent millions of dollars for new training facilities, programs and personnel. The utilities created INPO, the Institute for Nuclear Power Operations, and NUMARC, the Nuclear Utility Management and Human Resources Council, to pool their expertise.

But this is not enough. On January 3, the first day of this Congress, I introduced legislation, S. 16, to see to it that the people we trust to operate these massive public investments are capable of doing so safely.

This training could be conducted at one central campus--or at whatever sites make sense across the country. Instructors could be drawn from the ranks of the nation's nuclear engineering departments, or from the professionals within the utilities or INPO. And the oversight function so important to assuring adequate training might well be performed by many of those who now sit on INPO's accrediting board.

On March 20 of this year, the Nuclear Regulatory Commission announced that it would defer to INPO and NUMARC over the next 2 years, for the substantive work of ensuring adequate training programs. The nuclear utilities have committed themselves to having training programs "ready for accreditation" by the end of 1986 for 10 key positions at each of the 62 different units that were in commercial operation at the end of 1984. INPO clearly provides a valuable public service with its efforts to improve the nuclear power industry generally, but I worry that a voluntary organization of the nuclear utilities may not have the clout to force compliance with acceptable standards.

Much has been learned since Three Mile Island, but we can afford to wait no longer for the slower members of the nuclear utility industry to improve their training and operations voluntarily through INPO.

On June 9 of this year, there was an "unusual event" at the Davis-Besse plant near Toledo. A cascading series of equipment failures briefly left the core without adequate cooling, climaxing when the Pilot Operated Relief Valve (PORV) failed to close properly. This is the same valve through which the coolant leaked away at the Three Mile Island reactor. This time, the operators had the benefit of the experience at TMI, and they shut off the flow as they should have. No damage was done. As at TMI, however, an operator made a mistake at a key moment during the progress of the accident. Here, he pushed a button that he thought would ensure that an automatic safety system would perform properly—instead, he blocked the flow of cooling water to the core.

Despite the renewed emphasis on safety by the NRC, the utilities and INPO, we still have plants with long-standing maintenance problems. And we still have operators who sometimes push buttons when they ought to keep their hands in their pockets, or vice versa.

We need a new mechanism to raise the level of proficiency in the nuclear power industry, for the health of the public and for the health of the industry. I believe that S. 16 is a good starting point, but I am hopeful that we can learn from these hearings how we can do even better.

Senator MOYNIHAN. We have some very fine advisers here. I am going to start by welcoming our panel and first of all Dr. Ahearne, who was a member of the NRC.

I hope you would be speaking to me, but also to one another. I hope you would all feel free to interrupt as you like.

STATEMENT OF JOHN F. AHEARNE, VICE PRESIDENT, RESOURCES FOR THE FUTURE

Dr. AHEARNE. Thank you, Senator. I have submitted a longer version of my testimony for the record.

Senator MOYNIHAN. All the statements will be put in the record. But if you would like to highlight it; don't summarize it unless you are in a hurry.

Dr. AHEARNE. I still would rather just summarize it and perhaps after Tom and Mitch talk we can make comments. I would like to make a couple of opening comments, though.

First, you had mentioned Kemeny recommended a single administrator, as did Mitchell Rogovin recommend a single administrator, as did I. I guess I would like to petition the committee that if you do get to hearings on that, I would be delighted to come.

Toward the end of my testimony I quote an adviser to INPO. At the time I wrote the testimony, I had not yet reached him to get permission to name him. That is Dr. Forrest Remick.

But thank you for the opportunity to appear before you to comment on issues relating to the education and training of nuclear powerplant personnel. The subject of proper education and standards for nuclear powerplant personnel was of great interest to me during my 5 years on the Nuclear Regulatory Commission. There was no subject that caused me greater frustration.

To go back to a 1979 ACRS report that came out shortly after the TMI accident: they had looked at License Event Reports [LER's] and they stated:

> Human errors in the design, operation and maintenance of reactor components and systems represent a significant source of LER's. Up to 50 percent of all failures appear to be attributable to this source. Contributing factors include the use of * * * improperly trained personnel.

To try to get a handle on what other countries were doing with respect to training of personnel, in 1981 the NRC surveyed a number of foreign countries and came out with a report on foreign training requirements. Thirteen countries required an education beyond a high school degree. These included the United Kingdom, the Federal Republic of Germany, Canada, and Sweden. Eight of the 16 countries that responded to our request required a university degree for senior reactor operators, and 9 of 14 countries responding required a university degree for shift supervisors.

I have long advocated requiring an engineering degree for reactor operators.

The utility industry has not, to put it mildly, agreed with my approach. The frustration that I spoke of earlier was really due to the many conversations both in Commission meetings and private conversations that I have had over the years with people associated with the nuclear industry. They have consistently taken the position that any high school graduate, given appropriate training by the company, is quite capable of being a reactor operator.

Their arguments were not convincing to me. I did suspect that those arguments were partially driven by the belief that it would be inappropriate for operating personnel to be receiving salaries higher than midlevel management people. However, in the free market society of the United States, the way you attract more highly qualified people and keep them in jobs is by paying them more money.

My views were summarized in an article in 1983 in which I tried to summarize the lessons I had learned in the 5 years in the NRC about the problems of nuclear power and where it was going. In my conclusions I did address this particular issue.

I said:

> Another area where the industry has been incredibly shortsighted is in choice of operating personnel. The industry has continued to believe that operating personnel should be high school graduates whom the utilities train—because, according to the utilities, operating a plant is a boring job. The utility exposes not only people in the area around the plant to risk but also the financial survival of the utility itself. Furthermore, they place this risk in the hands of a few people who have only a high school education and company training. Utilities should treat their operating crews much as the airlines treat their pilots, copilots, and flight engineers—as highly paid individuals who must, if necessary, be given special treatment.

With respect to the specifics of your bill, I agree with the findings laid out in section 101. As to whether a National Academy of Nuclear Power Safety is the best answer, I don't know. I taught for 5 years in a Federal academy and spent several years in the Defense Department as an overseer of the personnel policies of the academies. I recognize the inherent difficulties in setting up a Federal academy, staffing it, and maintaining high levels of competence.

Nevertheless, I certainly agree the approach taken so far in the United States is one of great reluctance to address the fundamental problems associated with inadequate training of operators. It is difficult to address this type of a situation without demeaning those people who have given dedicated service in operating nuclear powerplants. I don't mean to criticize them, the operators, but I do mean to criticize the industry.

Nuclear technology advanced in size and complexity far more rapidly than most utilities were ready to handle. In the process, both managers and operators have had their limits exceeded. I believe that higher requirements are necessary to get sufficient competence into the control rooms to handle this technology.

Of course, the degreed person I am advocating must also get an experience building program. Apprentice training would be required to develop experience with the powerplant, but rather than taking a high school graduate, the program would start with a college graduate.

The Air Force does not take college graduates and immediately put them in the pilot seat of aircraft. The college graduate is given extensive flight training before going into an operational unit. If he or she is going into a multiengine aircraft, then after the flight training that individual goes into the copilot's seat. Similarly, what I have proposed is to take the technically trained persons and put them into the operator development program instead of starting with high school graduates.

I thank you for the opportunity to provide a summary of my views. I have long argued for improving the quality of not only operating personnel, but also of the maintenance people and of the management in the nuclear industry. It is a dangerous technology, but I believe it can be handled safely. It is not at all obvious to me the approach taken by the U.S. industry will lead to such safe handling.

Thank you.

Senator MOYNIHAN. I don't want to interrupt, but I just want to say you come at it exactly.

There is no point in being afraid of complexity in this matter. There are such things as status and cast and ascribed role in all of these things. I know that these old fire utilities are used to having people in overalls in those plants, which are clean plants, but you don't have lunch with them at the Duquesne Club. You make sure they did not go to Carnegie-Mellon. So you could always know who is in charge here, who has the degree.

The transfer of that mentality, that structure, to a nuclear plant, can be catastrophic. We are talking about the same thing; what our answer is I don't know. But this is the question.

Dr. AHEARNE. There is a similar analogy that has struck me in the Army versus the Air Force and Navy approach to pilots. The Army's pilots are warrant officers, which is a level of senior enlisted person. The Navy and Air Force pilots are officers. That sort of workplace ethic and sociology that you were speaking of from your knowledge and background is quite visible if you live in the military for awhile, the distinction between the positions they aspire to, the responsibilities they are given, the way they are treated.

Senator MOYNIHAN. Right. And the way they are treated. We haven't finished this conversation.

Mr. Rogovin, you are next on our list.

STATEMENT OF MITCHELL ROGOVIN, ROGOVIN, HUGE, & LENZNER

Mr. ROGOVIN. Senator Moynihan, at the outset I do want to commend the subcommittee for scheduling hearings such as these because we need an annual public audit of the progress of the NRC and the industry that it regulates. We need it in order to give the public an opportunity to determine whether the lessons of TMI have been learned and whether they are being implemented at a rate that is consistent with safety and the quality of life that we are all seeking.

You have invited me to speak on S. 16. I became familiar with the issue of the training of nuclear operators when asked by the NRC to conduct a special inquiry into the cause of the accident at TMI. The results of our inquiry indicated that most serious problems were not with the hardware. Nuclear power can be an acceptable, safe source of energy. What we learned was that the NRC and the industry had failed to provide the sound leadership and effective management necessary to meet national needs for safe commercial generation of nuclear power.

Getting back to S. 16, for all its attractiveness, I believe there is possibly a better solution that would lie in a selection and training partnership, cemented by economic incentives rather than the potential of coercive governmental regulation.

In my prepared text I deal with some of the findings that our group had made with respect to the training of nuclear plant operators. In that context, I stand behind everything that Dr. Ahearne said in his earlier testimony.

What we found was that the operators were exposed to training materials, but they certainly were not trained. In short, the training process failed to prepare the operator to perform their job, particularly under stress. The training programs focused on procedures and did not provide or enhance skills necessary to respond to foreseeable accidents or to diagnose new problems—much as Dr. Ahearne just pointed out with respect to the level of education from which the operators are selected.

The utilities should not be training people who simply respond on an automatic, rote basis to a series of problems. There has to be someone in the control room who can conceptualize and diagnose. That, of course, was missing at the time of the TMI accident.

Since TMI and the investigations that followed it, we have seen a lot of hard looking at the actual training going on and have seen increases in the resources devoted to training. We have seen increases in the members of individuals involved in training as well as the number of shifts at reactor plants. We have also been told about simulators that are now on site and how training can be undertaken with the actual data that is within the control room. There has been change.

These changes are certainly desirable and are to be encouraged. And much of it came as a result of the Institute for Nuclear Power Operations. I will leave it, however to the representatives of INPO and industry to speak on its behalf.

What I would like to do at this point is to take a look at INPO and at what it offers as well as what it is missing. Then we should take a look at what the Academy concept offers and what it is missing.

There are several advantages, certainly, to the industry-run training programs. I think, for example, it is important for operators and those in the industry, to be able to talk to one another in the absence of the NRC. The NRC is the regulator. Its job and its responsibilities are multiple and they have enough on their plate without being responsible for training. As a product of New York State, Senator, and I know the New York State Regents Program, and its relationship to the public school systems, I think the NRC should be Regents. They should set the curriculum and then test to ensure the product is a good product and the product is following a curriculum set out by the state. The NRC should not, however, be involved in the actual training. The actual training is something for which industry should be responsible.

Industry should be able to discuss its own problems of training without feeling it is impinging on the disclosure of potential violations or matters with respect to which the regulator will be upset. You avoid the unnecessary adversary relationship that exists between a regulator and the regulated by allowing industry to engage in its own training.

The problem, however, with this format is that INPO does not have much strength. It is the product of the willingness of the industry to support it. Like trade associations or other similar joint ventures within an industry, it is as strong as the good will of the "big boys." You cannot normally coerce everyone within the industry to participate in rigorous training programs. I want to suggest a possible form of economic coercion that might get you to that goal.

Senator, it seems to me that the weakness is the inability to get all of the utilities involved in an accredited training program. This training program could, however, be linked to insurance coverage.

If driver education courses for my children will become the basis for lower premiums for me, you can rest assured that my children will take driver education programs. If I have to wear a seat belt to have lower premiums, I will wear a seat belt. If the life insurance industry is wise enough to recognize that people who don't smoke are a better risk and lower premiums result from it, then we ought to encourage insurance companys to set the training standards or to let INPO set the standards for the industry.

Conversely, the unwillingness to participate in such a program by a utility certainly ought to be a recognition on the part of the insurance company that the risks are greater. Since insurance companies are in the risk management business, it would seem that the insurance industry is a possible lead to the type of coercion that we are looking for.

Finally, I think that the public utility commissions throughout the country might take a page out of what we are seeing in New York State and to disallow excessive insurance premiums. The definition of an excessive insurance premium would be one that did not reflect an accredited training program. If the utilities have to absorb these excessive portions of the premiums, then you might find a qreater interest.

There are means of still working within the industry on the educational program to get the type of accreditation and strength behind such programs that has been missing up to now.

S. 16 may be the necessary solution if INPO fails to obtain uniform accreditation of all of the utilities.

In concluding my remarks I want to underscore a point I made in "The New Yorker" some years ago, right after Three Mile Island. At that time I pointed out that the implementation of the Kemeny Commission recommendations and the recommendations of our Special Inquiry Group had been largely dissipated because Congress and the American public had such a very short attention span. At that very time the public's attention span was captured along with the hostage situation in Tehran.

Since then we have had another nuclear accident at Davis-Besse.

Senator **Moynihan**. An almost identical one.

Mr. **Rogovin**. Yes; and that incident has been driven off of the front pages by American hostages taken in Beirut. The cold, hard fact is that we who are at home, are all hostages to substandard training that exists in some of the nuclear plants throughout the country. This continues year in and year out.

Senator MOYNIHAN. Nicely said, sir. I am learning a lot.

Incidentally, the Price-Anderson bill has to be reauthorized on the question of insurance.

I might say, as a matter of personal information, in the 1950's I was involved with the problem of automobile safety. I was assistant to the Governor in New York at a time when this had great saliency for various reasons. I got involved with a young epidemiologist who was training at Harvard Medical. We kind of worked out the basic data I think. We defined the problem of automobile safety in terms of a system. We learned a fair amount about it, and questions of design and things like that. He was the first head of the National Automotive Safety Administration.

But two things. One is that we found it was absolutely impossible to break through to the industry on the problem. We were a bunch of young guys. If there were ever two innocents. Haden and I made our way out to Detroit with this good news, we have solved and defined the problem. They had these automobile crashes. They were not accidents. That is a prescientific word. They were predictable incidents in this system. They involved energy transfers at levels higher than were the thresholds of the human frame. We knew just what to do.

They, frankly, set the dogs on us. A person who owned a lot of General Motors let it be known if I was given tenure at Harvard University, there would be no more gifts from that foundation because I was saying if you don't do this, the Government is going to end up regulating you. That was my end of it. Haden understood the science and understood the political side of it. They could not understand that. Then they got regulated, and they still don't know what happened to them.

You also learn things about the insurance industry. The insurance companies didn't know a thing and never did until they finally hired Haden years later. But they just lucked into patterns. There was no evidence of any kind that driver training does anything about actual skills. But people who take driver's training have behavioral patterns that make for good drivers. That is what you could say.

Whether this would carry over, I don't know. But the question is, how does an industry which has origins in another technology deal with the new one.

Now, Dr. Pigford, we finally get to the scientist. We welcome you, sir. You have heard a lot that has gone ahead. Help us.

STATEMENT OF THOMAS PIGFORD, PROFESSOR OF NUCLEAR ENGINEERING, UNIVERSITY OF CALIFORNIA, BERKELEY

Dr. PIGFORD. Thank you, Senator. I will summarize what is said in my written testimony. I would be interested in commenting later on some of the points that have been brought up by others.

I am here as an individual. I was a member of the Kemeny Commission. I have been much concerned with the extent to which the Nation and industry have implemented some of our recommendations. Some of them have not been implemented.

I feel very strongly about those recommendations. I was quite offended by the things we found in that accident, more so than some of my colleagues on that Commission who are not in the scientific or engineering fields. I will tell you about some of the recommendations that need to be looked at again.

I also come here with a background of having followed the industry. I also am chairman of INPO's advisory council. But I am not representing any one except myself.

I applaud your theme in your proposed legislation because it emphasizes the importance and need for proper and quality training of nuclear plant personnel. I especially endorse the goal of comprehensive training of the people at all levels. It is not just the operators.

Senator MOYNIHAN. If the managers don't know.

Dr. PIGFORD. Yes, sir; that is one of the central themes of the Kemeny Report. It is vital that training and retraining be carried out at all levels as a continuing management responsibility of the utility.

We weren't saying they were doing it well. We finally said they must do it. It was in our view a necessity. We have to hold their feet to the fire to be sure it is done. I will explain why.

It is apparent that the successes of nuclear power, and there are many successes, have resulted from strong and careful management where they have occurred. And where there have not been successes but problems, it is quite true that those can be laid very clearly to management failures. Those are the people problems, the attitude problems that the Kemeny Commission underlined.

In our report, we cautioned, and I am quoting, "The legal responsibility for training operators and supervisors for safe operation of nuclear powerplants rests with the utility." It must rest with the utility. We were saying that it is the utility that is responsible for safety, and that responsibility must not be diluted.

We were concerned by the many Government actions that could be construed, however incorrectly, as relieving the utility of safety responsibility. We found many examples. For example, we said "The vast body of regulations by the NRC tend to focus industry attention mainly on the meeting of regulations rather than on a systematic concern for safety."

In a like sense, I am afraid a Federal training center, for which the utility itself is not directly responsible for performance and with no direct interaction with special training problems of each plant, could encourage a utility to focus its attention away from its ultimate responsibility for training. It could dilute the central safety responsibility of nuclear plant management. That is the problem of greatest concern to the Kemeny Commission.

The Kemeny Commission stated,

> We therefore recommend the development of higher standards of organization and management that a company must meet to operate a nuclear power plant.

Now, a key ingredient of these higher standards of management is training, of course; training at all levels—not just institutional training—training at all levels, training by the management and training of the management.

Indeed, as an aid to achieve these standards of excellence, the Kemeny Commission Report went on to say, "The Commission recommends the establishment of agency accredited training institutions for operators and immediate supervisors of operators." There what we had in mind was a number of training institutions where new operators and supervisors are screened and have their first nuclear plant training. We call that classroom type training.

Several such centers were expected because even the beginning classroom type training is by and large plant specific, or a very large part of it is. A plant's particular design features and operating experiences, many of which do change with time, and they are going to continue to change with time, must be fed back and integrated into the training program.

Likewise, the plant needs itself to integrate that classroom type training, which I think is the institutional training, into its own comprehensive and continuing training and retraining. In fact, the utilities have developed and are operating just such centers today.

I think the key issue is what is their quality, what is their effectiveness?

Now, there are many reasons why this is a necessary, integrated program. We recognized that in the Kemeny Commission. We said that there needs to be a greater use of simulators, reactor simulators, in training. And we recognized that such simulators themselves must be specific to the particular plant for which the people are trained. We found great fault with what had been going on in training.

We realized that no simulator represents every aspect of the plant and, therefore, each simulator itself will be modified and updated many times during the life of the plant to reflect the changes, the new information and the operating experiences, all of which will evolve over the plant life—true of any plant.

These are some of the many reasons why even formalized institutional training needs to be plant specific and closely allied with plant management.

In the Kemeny recommendations, we were seeking the strong oversight of an independent group or organization that could take an objective, critical look at all phases of the training program, including training by institutions and training by management. We were seeking an oversight that could develop high standards and monitor industry progress to these standards.

Now, from my observations of INPO, it has proved to be a remarkably effective vehicle for this oversight. I find it has proved it can instill high standards of training, operation, and management. I can't claim it has done its job completely, but it has proved it can and it is on its way. One of the most important things, it has earned the admiration and respect of the nuclear industry.

Incidentally, our council has been concerned many times with the question of where is the muscle, the teeth of INPO. I think that is something Mr. Rogovin brought up. If I have the opportunity later, I want to touch on that.

INPO has also earned the respect of experts in other fields related to this issue of training, especially the aircraft industry. We have relied upon them very deeply in our advisory council, and there are other such groups with broad industrial representation that are involved in the accreditation programs. Our council is made up of nonutility experts, people from science, aviation, human factors, and so forth. Our job is to provide outside review, advice, counsel, and to challenge INPO; is it doing its job?

Now, in conclusion, placing the responsibility for all phases of training directly on the nuclear plant management, where it belongs—and that may be the toughest approach, but it has to be there—and continuing INPO as the standard setter and watchdog to accredit training programs and to monitor the effectiveness of all levels of training is the most effective means that I see for the nuclear power industry and the Nation to achieve safe and reliable nuclear power.

Thank you.

Senator MOYNIHAN. Thank you, sir.

Let's have the three of you comment on what each of you have said. Dr. Ahearne first.

Dr. AHEARNE. Just a few comments on both Mitch's and Tom's. First, as far as the issue of using insurance as the lever, I am not a financial expert by any means, so I can't say whether that is the right lever. I certainly think using insurance as a lever is possible.

I remember when the INPO group was first formed and the industry came in to tell the NRC about what they were going to do and how it was going to be so powerful in the industry. At that time it was described, and I remember—I went back and looked in our transcript later to make sure I had it right—that the insurance would be linked to the INPO rating, and if the INPO rating was poor, the plant could not get insurance. So not too long afterwards that requirement was dropped, and it was that the insurance would consider the INPO rating.

I discussed it with the senior members of INPO at the time and I was told that this was just a minor change. It never seemed to me to be a minor change. It seemed to be a critical change.

Senator MOYNIHAN. Yes. We will ask them about that.

Dr. AHEARNE. The second point was that the nuclear industry insurance is somewhat different than most insurance. It is not done by the large insurance companies, at least it wasn't as of 2 years ago when I was most familiar with it. There are a couple of insurance groups that were formed specifically to insure nuclear powerplants. So I am not sure how completely independent they are of the industry. That is a second element.

The other one is to me, the constant question really has been who is going to go into the program. I keep repeating I believe that the compensation, the status, the salary, the competence, all are linked to this level of professionalism, which I think does require the higher degree.

The other point I would make with respect to Tom is I would agree with him, INPO is a remarkable step that the industry took. There are many of the industry leaders who pulled together to form it and to push it. They have worked hard to get very competent people running it and advising it, such as Tom.

I would say that there are still two questions I have which I had when I left the Commission. First, and I did go back and talk to some members of the Advisory Committee on Reactor Safeguards recently, as late as yesterday, just to verify this was still true, there is a sense within at least the regulated side of the industry that INPO still does not release its reports quick enough or completely enough. So their reaction is that INPO still is an industry organization.

Second, for myself, just as a sort of observing skeptic, I will have a lot greater confidence in INPO's clout when they say "this plant is unacceptable."

Mr. Rogovin. Senator?

Senator Moynihan. Did Dr. Pigford want to respond?

Dr. Pigford. Certainly.

Senator Moynihan. Organize yourselves, gentlemen. You obviously know each other.

Mr. Rogovin. Let me just make a couple of remarks. This will allow you to respond to both of us since I believe my remarks are generally supportive of Dr. Ahearne.

I would be concerned that we don't try to make INPO the successor of the Nuclear Regulatory Commission. It isn't. The NRC has very significant responsibilities, and INPO ought not to be forced to carry their water.

But if the question of training is going to be an industry undertaking, if INPO is going to be the arm to engage in that training, there has to be an accreditation procedure in which some pass and some fail. There has to be a statement by INPO that this is the case.

The NRC is reluctant to rate, indeed I believe they do not rate utilities. I suspect I would not be asking INPO to indicate which are the substandard utilities. Rather, INPO should not accredit training programs that are substantial. It is up to the NRC to determine whether the license requirements have been met. So I think that the issue of accreditation is an important feature of INPO's undertaking.

Senator Moynihan. The Kemeny Commission asked for an objective oversight on these matters, did it not, sir?

Dr. Pigford. Yes, sir.

Senator Moynihan. Where is that in the arrangements we have now?

Dr. Pigford. Speaking specifically of the accreditation, the objective oversight, the depth of it, that I know of, is within INPO. It does formally accredit training programs and it has set up an in-depth oversight group which consists of experts drawn throughout the country, and they spend a lot of time on this. That is where it occurs now.

Senator Moynihan. Here is this Senator's thinking. I have a sufficient distrust of Government. I have spent my life in it. I have an enormous trust of private arrangements.

There is no oversight arrangement for deciding who becomes a professor of physics at the University of California, Berkeley. You do. You decide yourself, right?

Dr. Pigford. That is a very provocative point.

Senator Moynihan. No committee; the professors decide. It is a fact. And that works very well. Professions have managed to establish standards that, by and large, economic institutions are not good at because they have different sets of goals, and peer review among utilities is a very weak proposition because they all have their own spatial arrangements and they don't in fact compete much with one another.

I was once in the Navy, 45 years ago or so, I don't know. I was a runner in the communications office. I had a sister ship with an ensign who had the same job. We always were sending in these reports to BUPERS and BUFERS and BUSHIPS. We had a report every quarter on the condition of our not very extensive weaponry.

We were suspicious whether these reports really got read. One quarter my buddy, when he was asked about the condition of the aft antiaircraft, 40-millimeter mount, he said "Alas, it was washed over alongside Cape Hattaras and we missed it. Nothing we can do about it, and nothing to report because we lost it." And we never heard a word.

So I don't know where we find ourselves as between the extraordinary capacity of our professions. Who decides what a good doctor is? Doctors. Who decides what a lawyer is? Lawyers. And who decides what a professor of nuclear physics is? The members of that department. Nobody says anything to them.

It has worked. I don't know if we have the best lawyers—I am sorry about that, sir—but we certainly have some of the best scientists and nuclear physicists in the world. On the other hand, I don't know if we have the best nuclear power people because they are in such trouble.

Dr. PIGFORD. But there is a good parallel from just what you say. Those professions, doctors, whatever, that do have high standards, they get them by setting them themselves.

Senator MOYNIHAN. I know that.

Dr. PIGFORD. In fact, each one of those has some degree of oversight. I think you are exactly right. There the oversight is not the thing that finally develops the standards. It is setting the standards by the profession itself. And how do you do that? It is a complicated process, and what you are proposing focuses the issues and challenges the industry, which is most helpful.

But could I add to another thing? One thing I am afraid of is the emphasis in these discussions on the operators, they are only one part of the whole group, and on the institutional training. Let me go back to Three Mile Island.

Let's take these two operators. I don't want to castigate them again, but we can learn something from that. They made mistakes. They were badly trained. Do you remember that in fact those two operators came from the nuclear Navy and they were well trained at one time? We went into this. The very fact that they went through a good training program did not ensure they would operate the plant properly.

What happened? It was the failure of the TMI plant's system of training and retraining, under the overall responsibility of the plant manager. The plant management knew they had to retrain their operators. That is where they fell down.

That to me is a clear lesson that tells us not to look at just the institution of training to solve our problem. And I am afraid that focusing only on training institutions will lead us away from the real problems.

Senator MOYNIHAN. We know that. And it has to be. Again I am going to get into sea stories, but the nearest thing I have ever come to feeling like a scientifically trained person, we were in Norfolk for a month and they sent me off to loran school. We were just getting loran aboard our ships. I went down to Little Creek for a week. I learned how to operate the loran. We had that X-ray tube and all sorts of little things on that, and it was a little difficult. You sort of moved a particular dial until you got it on top of another column, one column on top of another column, and that told you what direction you were going in. You found your way to fly.

I could operate that loran perfectly. I got a score of 98. I am proud of that. But I didn't have the slightest idea what was going on behind that screen, not the least notion. If it didn't work, if it was telling me just the opposite of what it should be, I wouldn't know. I just didn't know the physics. I didn't know any of the realities there. Therefore, no signal of malfunction would ever come to me. Or if it did, I just banged the machine or something like that.

Some level of understanding beyond that of a training manual. Don't you feel that way?

Dr. PIGFORD. Yes, sir. In fact, your analogies are perfect for the message I am trying to give. I, too, at that time was involved. I was involved in radar. I was supposed to be the person on the ship who finally made sure the technicians were doing their job. How was I trained? This is a theme I have injected into INPO and I believe they have adopted it; namely, the diagnostics of safety management.

Now, here is the way the Navy did it with me. First they sent me to a school at MIT and Princeton. That was the institutional part. But finally, on that ship, or in that shipyard—I worked in both—part of every week was devoted to making sure that I was up on the job and learning more. My superior officer would come in and he would take one of the radar units and put a flaw in it and he said, "Go find it." There was no textbook solution. I had to diagnose it and I had to learn why it was working improperly. I had to learn diagnostics.

Now, I didn't learn that at MIT. I learned that on the job. That is what we have been pushing in the INPO council.

Senator MOYNIHAN. But I am going to tell you something, sir. If you hadn't gone to MIT, you would not have turned out to be much of a diagnostician.

Dr. PIGFORD. Well, Berkeley would be OK.

Senator MOYNIHAN. It was that grounding in the fundamental theory that helped you.

Dr. PIGFORD. Yes, no doubt about it.

Senator MOYNIHAN. I mean both. That is what we are talking about, isn't it?

Dr. PIGFORD. And that is just what we must rely upon in the nuclear plants. Three Mile Island, sure, the operators were not MIT graduates. In the Three Mile Island accident, that was an accident that finally involved, with plenty of time for diagnostics, the shift supervisors, the plant manager, and the plant technical superintendent. That whole group of management people are the ones who must have the skills of diagnostics training. And that is what the Kemeny Commission was trying to emphasize.

Senator MOYNIHAN. All right.

I am thinking of the time all of you have. But may I just say that in this regard, one has just a vague impression, that is all I have, that Three Mile Island and Davis-Besse, the operators there didn't really know their machine well enough to trust it and started pushing buttons when the machine actually was working all right. But that is because there is a separation between that machine and you.

Well, I think we are getting something here. I want to thank the three of you very much. You are not discharged. You have come before us with such generous experience. We are going to be back at you. We are not going to ask you to come flying around the country and all. We want to do something here. We are not fixed to any proposition. We want the nuclear industry to flourish. We are worried about it now.

I think your remarks of the hostages have twice taken the issue away from our attention in a way, that doesn't mean the issue doesn't remain.

Gentlemen, thank you very much. May I, as a member of this committee, say we know how much you have served your country and this industry—at per diem rates. I would hate to ask what you got paid as chairman.

Dr. AHEARNE. Thank you, sir.

Senator MOYNIHAN. Thank you all.

We are now going to hear from Sherwood Smith, chairman of Carolina Power & Light.

Senator MOYNIHAN. We welcome you, sir. We have your testimony. We will hear it just exactly as you like. Of course, it will be put in the record.

STATEMENT OF SHERWOOD H. SMITH, JR., CHAIRMAN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, CAROLINA POWER & LIGHT

Mr. SMITH. Thank you very much, and good morning, Senator Moynihan. I am Sherwood H. Smith, Jr., president and chairman of the Carolina Power & Light Company. I also serve as chairman of the Edison Electric Institute and am a member of the Board of Directors and Executive Committee of the American Nuclear Energy Council. My testimony is submitted this morning on behalf of all three operations.

Senator MOYNIHAN. Good.

Mr. SMITH. Carolina Power & Light Co. owns and operates three nuclear power units and has a fourth unit under construction. Our first unit was brought into service early in 1971. It was one of the first completed in this country. It is located in the State of South Carolina. It is operated very well, very safely, very effectively, very economically. We take a great deal of pride in its operation.

We also built the first nuclear plant in North Carolina, where two units came into service in the middle seventies and have operated about 10 years. As I said, we have one unit under construction scheduled for operation next year.

If I may, I might comment, please, on the subject that you raised initially, the question of the Nuclear Regulatory Commission and its functioning as an institution; whether, for example, it might function better if it were changed to a single administrator.

I was pleased that that subject was raised with this body. I listened very carefully to the comments of the panelists. Certainly, as was said, the Kemeny Commission, Mr. Rogovin's statement today, and Dr. Ahearne's statement I think all point in the direction of the value of Congress studying the question of whether or not the NRC, because of its decisionmaking process, may not be working well. The commissioners themselves and the chairman have said that.

I think the study of that issue and the study of the question of whether or not a single administrator might be a better way to proceed is very appropriate. We would be glad to comment at any later time with regard to that.

Senator MOYNIHAN. We are going to have a proper hearing on that, and you will be back. Thank you.

Mr. SMITH. Excellent.

My comments are directed to the training now provided in our industry and also, for illustrative purposes, the training provided by our company. The subject of improvement is certainly acknowledged by our industry as being tremendously important, and there are plant systems, there are individuals, operators and others, and there are certainly managers on up through senior management, all of whom have significant opportunities for improvement.

But if I said that without making this statement, it would not be a complete statement of the picture in the country. I think it should be said for the record that there is a large number of tremendously well qualified, dedicated, very, very capable people operating nuclear powerplants in this country today. While we appropriately focus on how we can bring everybody up to the level of a standard of excellence, I think in discussing the problem, someone sometimes misses the forest looking at the trees. We do have a great many people who are doing an excellent job keeping the lights on around the country very, very safely. And as has been said many times before, there has never been an injury or death from radiation in the operation of these plants. So I would just like to say that by way of background because it would not be complete if I did not.

As I said, our company operates three nuclear plants. We have been a member of the Institute of Nuclear Power Operations since it was first chartered. I would hope that after the discussions here this morning and perhaps later in the full examination of the subject that it would be determined by those interested that the continued expansion and strengthening, and I will underscore the word strengthening, of the current industry program rather than a Federal facility or Federal system will be shown to be the better way to proceed.

Nuclear powerplant training today is much better, more comprehensive, than it was in 1979 at the time of the TMI incident, despite the recent event that has been referred to. In 1979, nuclear powerplant training programs varied widely. Some were very modest in scope. Today, utilities are applying the latest techniques of job analysis to ensure that training is performance based and that the required knowledge and skills are developed and demonstrated by all operators.

I think the systematic approach has resulted in a tremendous improvement in training. I think the NRC testing and the NRC surveillance has also been substantially strengthened. I think the process of the Institute of Nuclear Power Operations reviewing and accrediting nuclear training programs is a standard setting that to my knowledge in our current U.S. industry picture is just unexcelled in the strength of it and the value of it and the quality of it. You will hear more about that from Mr. Zack T. Pate in a few minutes.

The industry has adopted an integrated approach to training. It is certainly more than just the operators. It is the functioning of a group of people, and it is a functioning of a management system.

The utilities do have the responsibility and the accountability for proper training. We work with INPO for their guidance and assistance and evaluation. They have accreditation guidance from the National Nuclear Accrediting Board. But there is close monitoring of industry and individual utilities by the NRC.

But further, and perhaps more to the point, is for me to say I know the utility, individual chief executive officers and senior management well. I know them personally and know they are strongly committed to carrying out their responsibilities to provide high-quality training and achieve accreditation by INPO.

I know the concern that utility management has for the safe and efficient operations of their plants. There is nothing in any organization that is any more important than that. It is a major discussion of topic every time there are senior utility executives together. It is a matter discussed when there are Institute of Nuclear Power Operations meetings and other industry meetings.

I think the utilities have taken this initiative because, as stated in the Kemeny Commission, they do recognize that it is their responsibility, and they recognize also that only they in the last analysis can really do the job that needs to be done.

Our company is one of 55 members of INPO. What I say about our company's training program is illustrative of what is going on in other utilities around the country. But I would like to illustrate what has happened in our situation over the last 5 years, going back to 1979 and to the TMI accident. This is reflected on page 8 of my filed testimony.

In 1979, we had a training staff, a permanent staff, of 23 persons. That is now up almost 7 times to 141. Our operating budget for training in 1979 was approximately $1 million. This year it is over $16 million. We have three nuclear sites and we have invested $37 million in training facilities. By the time we complete the addition of a third simulator at one site, we will have invested almost $40 million in those facilities.

The training of personnel in our nuclear operations has been the fastest growing part of our company over the last 5 years. We think we have developed a well-staffed and comprehensive program. As I said, it now has 141 professionals. Last year we had in training 637 people just for nuclear operations. We had another 893, almost 900, involved in craft development training, which emphasized in some of the courses nuclear skills, because craft development people will be involved in such important things as maintenance, and there is a great relationship between the training of your maintenance personnel and the safety and effectiveness of your operations.

We have, as I said, three simulators, including the one on order. The use of a simulator there at the plant site we think is tremendously important because the simulator enables the people who are being trained to freeze actual operating conditions in the plant. They replicate it through the use of computers. They freeze those conditions. The freezing enables one to study and analyze that due to the type of diagnostic work Dr. Pigford described.

We think this is tremendously important. It is being done throughout the industry. In 1979, for example, there were 10 simulators in use. We were the first utility in the United States to purchase and install a simulator, this was in 1977, on our own site. There are now some 70 simulators installed or in the process of being installed or on order in this country.

Our company has more than 500 years of actual operating experience in nuclear training programs. Our vice president who is in charge of our entire nuclear and other training is a senior reactor operator himself. He is licensed. He also is a former nuclear plant manager. He is here with me today. Under him, in charge of just our nuclear training section——

Senator MOYNIHAN. Why doesn't he come up.

Mr. SMITH. I would like to ask him to. Mr. Furr, why don't you come up.

Senator MOYNIHAN. Come on up. Break down this corporate hierarchy.

Would you give your name for the record, sir? We welcome you.

Mr. FURR. Senator Moynihan, my name is Ben Furr, vice president of operations, training, and technical service for Carolina Power & Light.

Senator MOYNIHAN. We welcome you to the hearing.

Mr. FURR. Thank you, sir.

Mr. SMITH. Throughout the country, obviously there would be an even larger number of professional people involved in training. According to the INPO records, the industry now has 2,100 full-time training personnel and almost 1,700 of those are instructors. That is an average of 22 instructors for each of the plants in operation. This is four times as many as we had 6 years ago at the time of the TMI disaster.

So I think the record speaks for itself that the industry has made a tremendous investment in training, that the quality of training is light years beyond where that training was in 1979, that by and large we do have a cadre of very skilled people operating these nuclear plants today. Certainly in our company, regardless of the dress that they may wear, as long as it is neat and appropriate, we judge them by their performance, not by their appearance.

But that is not to say appearance is not tremendously important because, I think, in the minds of the public, and we are really dealing, I think, as much with public perception as we are with actual training competence, it is tremendously important that our industry do a better job in explaining to the people what we are doing in nuclear training.

You are here this morning, one Senator. There are 99 other Senators. I wish we had an opportunity to appear before every 1 of the 99 as we do before you and describe what we are doing in nuclear training and to talk about the problem. That is a difficult thing to do, but we intend to try to contact all of them. We do have a program in place.

We have a high success rate in our company with regard to NRC licensing examinations. At our Robinson plant, over the last 4 years, we have had 36 candidates who have taken the NRC operator or senior reactor operator examination. We have had a success rate of 98 percent. Thirty-three out 36 have passed.

Our company was the first company selected by NRC at our Brunswick plant to go through the requalification program. Retraining is tremendously important. We had 15 operators examined in 1983, the first time it was done in the country. Thirteen out of those 15 passed the first time. The other two passed soon after that with a little bit of training.

I personally get involved in this from the standpoint of visiting the plants, recognizing the accomplishments of our operators when they do achieve their licenses. I think it is tremendously important that management do this. I see my fellow chief executive officers around the country doing the same thing, as do their chief operating officers and senior nuclear officials.

I would say, in conclusion, that we strongly support the comprehensive industry system that is operating now. We are committed to it. I think I speak for the other utility CEO's when I say that. I have no reservations about making that statement. I think the program we have established with INPO, with the work that is being done by the individual utilities at their sites, certainly needs to be supported, needs to be strengthened where that can be done. We think this is a better way to proceed than would the establishment of a Federal facility. We hope that the hearing that has been initiated this morning will lead to that.

I thank you very much, and we would be available for any questions that you might have.

Senator MOYNIHAN. Thank you, sir.

Let me just make a general statement here, which is that I am as puzzled about how to proceed as you are. You think we should keep steady as we go. When the next accident comes; we will have all 100 Senators here, no doubt about that. That is our problem here. How do you do something in a quiet moment before the next accident happens?

I am not sure it is an accident. I don't like that one. It is a prescientific word. They are sort of predictable events in the system. When you get down to Heidelberg, there are some unpredictable events. But the incidence of these things is probably closer to quantifiable and they act like there is no explanation how this could have happened, it was an accident.

When you say, sir, that we are light years ahead of where you were in 1979, that there were 10 simulators then, there are upwards of 70 now, see, that is the kind of problem most industries have. The responsible come to a certain kind of failure, then you will respond. It is the fact that this was not done that what you now see surely needed doing. You didn't do it on your own. You had to almost "lose" western Pennsylvania. Of course you didn't. But there is this very serious business up in Dartmouth where they wished, as publicly stated, we had killed a couple million people—only professors think like that—at TMI so the country could understand what was going on. You take a couple million deaths and everyone permanently leaving Harrisburg and that would sink in. That aspect is not to be underestimated.

The other thing here is, and my physics aren't that good, my physics hardly exist, but unlike most any other activity, the nuclear power generating system is probably going to be allowed only one really bad accident, if you know what I mean, one real meltdown, one real discharge, some deaths. As you say, no one has ever gotten a head cold out of a nuclear plant. But I guess my bet is one, sir. Would you not agree?

The public will respond in a way that is not fair, it is not rational at some levels, these attitudes. Think about the amount of absolute individual horror that we have gone through for 100 years of coal mining in this country. But it is far away. It is in West Virginia. It is underground. And it is in one sense limited and it doesn't affect the customers, as it were. I mean coal mining is the great horror of industrialization.

I don't know, sir. You think the industry has responded. Yet it wasn't until you had a problem that you responded. I have seen industries go through these patterns. Not that you don't know what you are doing. You know a lot more what you are doing than I know what you are doing.

When we speak of an academy, we are not talking of a building as such. We are not talking about Annapolis or West Point. Wouldn't you feel better if there was somebody quite separate from you checking you out, because you know, it is not the turn on of power that is likely to cause the trouble. There is a curve here. They are over here on the high 90 percentile. It is somebody down in that 10 percentile. They are going to cause you trouble, aren't they? You don't even know who they are.

Am I making any sense to you?

Mr. **Smith**. Yes, Senator. If I may reply now to one or two of your points?

Senator **Moynihan**. Certainly.

Mr. **Smith**. Your last point first. With respect to the value in the system of additional oversight, some sort of Federal regulatory body that supervised training, I think one should first look at the role of the NRC here, and perhaps I should have spent more time on that because we see them every day. At each of the operating plants and the plants under construction, the NRC does have resident inspectors. The NRC does have the authority and in fact the duty with respect to any activity within a plant, whether it might be associated with an operator, whether it might be related to training, whether it might have something to do with maintenance, or something to do with hardware, they do have the responsibility to the public to ensure that the plants are operated safely. I think that is essential.

I think that is where the Federal responsibility for safe operation should be, with standards, with rigorous enforcement, with certainly no compromise of anything that has to do with safety. And I don't think anything is or has been compromised. But I think that is where the appropriate Federal involvement and oversight is.

As Dr. Pigford said, if you seek a Federal standard setting and enforcement setting body in that setup, then attention is naturally going to focus on what are the Federal standards, what are the requirements, and meeting them rather than doing what in the manager of the plant's best judgment actually needs to be done. You are going to be meeting the requirements, and that is going to take your attention, rather than doing what the plant operators think should be done in the plant.

And while one would hope that the federal system, whatever it was, was wise enough to have in place exactly the perfect standards for each of these plants, we have 81 in operation now, about 4 more coming, going up to full power, about 4 more that have their low power license, and we will soon have over 90 in operation, all different. I don't see how it would be possible for the Federal standards to be perfect.

But even if they were perfect for each plant, you would have the attention of management focused on meeting the Federal standards and not on doing what should be done in the plant. I think it would weaken input to the point where it would not be nearly as effective as it is now because why would one try to meet the INPO standards of excellence while you are trying to get everybody up above the average? You are trying to take that 10 percent and get that 10 percent up above the average and continually move that average higher. Why would you do that if on the other hand you had a Federal requirement that you do something else? You would meet the standards of the policeman.

Senator MOYNIHAN. All right, sir; a fair question. On the other hand, taken to its extreme, we wouldn't have any Federal standards at all. And, of course, this is an industry so deeply imbued with Federal interest. The Federal Government created the power and urged you to use it.

I hear you very clearly. You are proud of what the industry has done. You are obviously proud of what you have done. We are not going to regulate you. I mean we are not going to try to impose anything on you that doesn't exist by the virtue of this ordinary technology. There-are another few plants coming on, but not many. Not many.

There is another side. It is the Energy Committee that looks at the issue more and says it is not clear where the power in this country is going to come from in the year 2000. Thank God the Canadians have a lot of lakes.

I know that your time is short and you are pressed. You have stayed longer than you expected. We thank you very much for coming and bringing your colleague along. Keep the lights shining in South Carolina.

Mr. SMITH. Thank you very much, Senator. I appreciated the opportunity to provide you with our thoughts. We will be glad to answer any questions you may have for the record.

Senator MOYNIHAN. You have not heard the last from us. We will submit questions to you. Thank you.

Now we will here from Dr. Zack T. Pate, president of INPO, of which all things have been said the last couple of hours. It is time you had a chance to respond.

Dr. Pate, we welcome you. I am not going to ask you, but I have the urge one day to have somebody explain to me the difference between president, chief executive office, chief operating officer and chairman of the board. But that is too complicated a subject for our present operation.

STATEMENT OF ZACK T. PATE, PRESIDENT AND CHIEF EXECUTIVE OFFICER, INSTITUTE OF NUCLEAR POWER OPERATIONS

Dr. PATE. Senator, I am glad you are not going to ask me to explain that.

I appreciate the opportunity to talk about the organization that has consumed almost 100 percent of my energy over these last 5 years. I am president and chief executive officer of the Institute of Nuclear Power Operations.

My background includes over 20 years in the Navy Nuclear Submarine Program. I graduated from the Naval Academy in 1958. I earned a Ph.D. in nuclear engineering at MIT in 1970. So I have devoted virtually all of my professional life to the operation and maintenance of nuclear powerplants.

The Institute was formed by the U.S. Nuclear Utility Industry in late 1979 to promote high standards of safety and reliability in the operation of the Nation's commercial nuclear plants. We are a nonprofit organization with a staff of just over 400 and a 1985 budget of $42.7 million, mostly for salaries.

I am pleased to have the opportunity to tell you about INPO's work in training and education. I will briefly describe INPO activities and then discuss training and education programs and the National Nuclear Accrediting Board in more detail.

Our Institute has four cornerstone technical programs. These are, first, the evaluation of operating nuclear plants and their supporting corporate organizations. To date we have conducted 185 evaluations of operating plants. Second, the analysis of nuclear plant events and the dissemination of lessons learned to member utilities. Third, training and accreditation. And the fourth cornerstone technical program involves various forms of assistance. For example, in 1984 alone, we made 99 special assistance visits to member utility's plants at their request. These visits cover many areas of the nuclear plants' operations and maintenance.

All 55 utilities that own or operate nuclear plants are members of the Institute. In addition, we have an extensive international participant program. Nuclear utilities representing 13 countries outside the United States participate with INPO. These include Spain, France, Belgium, the United Kingdom, Sweden, Germany, Italy, Canada, Mexico, Brazil, Taiwan, Japan and Korea. That is all the free world countries that have a substantial nuclear involvement except Switzerland.

In addition there are 13 supplier participants, such as Atomic Energy of Canada, Limited, Westinghouse Electric Corp., Bechtel Power Corp., Frametome, Stone and Webster, and eight others.

Rather than discuss INPO's technical programs in detail, we will provide you with two documents that describe the Institute's programs.

Senator MOYNIHAN. We welcome our chairman back and pass the gavel. Mr. Chairman, we are hearing from Dr. Pate who is the president and chief executive officer of the Institute of Nuclear Power Operations.

Dr. **Pate**. Mr. Chairman, I just described that INPO has 55 member utilities, 13 international participants, and by coincidence 13 major supplier participants throughout the free world.

Rather than discuss our technical programs in detail, I will provide you two documents that describe our programs. These are our institutional plan and our 1984 annual report. The annual report describes INPO's implementation of all of the Kemeny Commission recommendations that are within the Institute's jurisdiction.

With that background and those two documents in the record, I will now focus my discussion on results rather than the programs described in these documents.

For the past 3 years, INPO has been working on a set of performance indicators for nuclear plants. We collect and analyze data for some 44 performance indicators and have selected 9 that are good overall measures of performance. These are described in a May 1985 performance indicator folder that we would also make a part of the testimony. I have some charts that show five of these performance indicators.

The folder shows industry progress in the nine performance areas. Let me quote a key paragraph from the folder.

> It is widely recognized that nuclear plants with high availability or capacity, small numbers of forced outages, few unplanned reactor scrams, few significant events, and low personnel radiation exposure are generally well managed overall. Such plants are more reliable and can be expected to have greater margins of safety.

We have selected five of the nine overall performance indicators to discuss briefly this morning.

The first is unplanned automatic scrams. This graph shows the average number of unplanned scrams initiated by plant safety systems from 1980 through 1984. As can be seen from the chart, the number of scrams has dropped steadily from six per unit in 1980 to three and a half per unit in 1984. Recall that the TMI accident involved an unplanned scram. In fact, if other systems had worked as designed and if the operator actions had been correct, the event would have been classified as an unplanned scram. So this is an important indicator, and the industry is making progress in this area.

The second chart shows average plant availability. Availability is the electrical power a plant could have produced as a percentage of its rated capacity. As can be seen from this chart, the industry's performance has changed little in 5 years. However, plants have undergone extensive outages during this time, for post-TMI accident backfits and for other long-term plant upgrades. With such changes now behind the industry, I fully expect to see significant improvement in this area in the coming years.

Senator **Moynihan**. That is not just the normal ratio? You get about 60 percent of your capacity?

Dr. **Pate**. It should be higher, Senator. Some individual plants in the country are up in the high sixties and seventies.

Senator **Moynihan**. So there is a curve.

Dr. **Pate**. Yes, sir. We think that it can be better.

The next chart shows solid low-level radioactive waste shipped from each nuclear unit. This is for pressurized water reactors only. This graph shows the average volume of solid low-level waste shipped to burial sites for operating reactors. As can be seen from the chart, the amount of waste per unit has decreased by 30 percent over the past 5 years. I think that decrease is even more significant when the extensive outage work accomplished during this past 5 years is taken into account.

The next chart, personnel exceeding five REM of radiation exposure in one facility, shows the number of utility employees who received more than five REM total radiation exposure per year. Minimizing the number of personnel at commercial plants who exceed five REM has been an INPO criteria since 1981. Five REM is also a recognized threshold by the International Committee on Radiation Protection.

The data does not include contract personnel who move from plant to plant. But as can be seen from the chart, in 1980, 311 personnel received five REM or more. By 1984, that is down to zero. We are quite pleased with that achievement industry wise.

The last chart is significant events per unit. It shows the number of significant events per reactor at operating U.S. nuclear plants.

Senator MOYNIHAN. Could I just interrupt, sir, to ask what is a significant event? Would you describe that for the record?

Dr. PATE. Yes, sir. This is the one chart of the five that is based on subjective judgment, but it is based on a methodology that has been in place at INPO for 4 years. Each event goes down two screening channels. Those that are significant by a set of criteria are screened out for further analysis. The lessons learned from that event are then provided back to members and participants so they can benefit from the experience of others.

Senator MOYNIHAN. You mean something didn't work right and you wondered why?

Dr. PATE. Yes, sir. It could be a failed pump, for example.

Senator MOYNIHAN. Sure. Thank you.

Dr. PATE. Each year INPO reviews extensive operating experience from utilities, from the NSSS suppliers, and the Nuclear Regulatory Commission. We carefully screen the events for those that are significant. The criteria for selecting these events has remained essentially constant since 1981. And as I said, each is screened through two channels.

As can be seen from this chart, the number of events per reactor has come down from 1.64 in 1981 to .7 in 1984. We believe this improving trend is a result of better training, better management, and better feedback of worldwide operating experience to all U.S. plants.

Those are five of the nine charts that are in the folder.

It is not my intent to claim credit for INPO for this industry progress. Many have contributed—the NRC, the Department of Energy, other utility organizations, but most importantly the utilities themselves. But we do believe that INPO has helped bring about this improving trend.

I would also like to acknowledge, however, that we have room for considerable additional improvement.

With that background and that report on progress, let me shift back to training and education because that is truly the foundation for future progress and it is our best insurance for safe plant operations.

Shortly after INPO was formed my predecessor, Dennis Wilkinson, established an outside task force to review the question of whether utility training should be done on a local or regional basis or perhaps in a national center. The task force recommended that training be accomplished on a local basis for several reasons.

On the basis of that recommendation and similar conclusions by the Department of Energy, and the Nuclear Safety Oversight Committee that was appointed by the President and chaired by Governor Babbitt, we proceeded full speed to develop a national plan for utility training program development and accreditation. That plan is in place and we are well under way in its implementation.

The national training plan under our management includes three major parts: First, the establishment of training standards and monitoring of these standards by INPO; second, utility implementation of performance-based training programs for personnel in the 10 key positions that operate and maintain and manage their plants; and third, oversight and final accreditation by an independent national nuclear accrediting board.

To give you an idea of the caliber of people who make up the accrediting boards, let me just name a few of the 18 members. Dr. Ed Jones is chief human factors engineer at McDonnell Douglas Aircraft Corp. Dr. Bill Kimel is the dean of the College of Engineers, University of Missouri. Mr. John Carroll, who is with us today, is vice president of training and flight standards (retired), United Airlines. Dr. Russell O'Neal is a dean emeritus of Engineering and Applied Science at UCLA. Mr. Cordell Reed is a vice president of the Commonwealth Edison Co. Dr. Forrest Remick, who is also with us today, is associate vice president for research and graduate studies and a professor at Penn State University. Dr. Remick is a member of the Advisory Committee on Reactor Safeguards.

Dr. Remick and three of the other members of the accrediting board are nominated by the Government.

With 61 nuclear stations in operation by the end of last year——

Senator Moynihan. I didn't quite hear you, sir. You say nominated by?

Dr. Pate. By the NRC, sir.

Senator Moynihan. The NRC nominates people to your oversight board?

Dr. Pate. Yes, sir.

Senator Moynihan. Is this an informal arrangement you have made?

Dr. Pate. Senator, it is quite formal. It is in the charter for the accrediting board.

Senator Moynihan. And they agreed to do it.

Dr. Pate. Yes, sir. And they have nominated 4 of the 18. It is set up so that one of their nominees must be present each time the board makes a decision on awarding or deferring accreditation.

With 61 nuclear stations in operation by the end of last year—more units, but 61 stations—and 10 training programs at each station, there are 610 programs scheduled to be ready for accreditation by the end of 1986. To date, 68 programs have been accredited. All of INPO's member utilities have committed to have their programs ready by the end of 1986. Each CEO has committed to that personally to me. Through yesterday, we had received utility reports on 157 training programs or just over 25 percent of those due in to us by the end of 1986.

INPO's role in training and accreditation is extensive. Since January 1983, we have made approximately 149 training or accreditation assistance visits. More importantly, full accreditation teams of 11 or more people have conducted formal evaluations of 103 utility training programs.

In summary, we have put in place a structure for an effective national training and accreditation program operated by the private sector but allowing ample opportunity for overview by the Federal Government. The Institute of Nuclear Power Operations has set high standards for the training of nuclear plant personnel. As a condition of membership in INPO, every utility has committed to meet these standards and to achieve and maintain accreditation. The independent National Nuclear Accrediting Board ensures that the training programs measure up to these high standards.

We believe that this structure in substantial measure meets the intent of Senate bill 16. We therefore, sir, request your encouragement and your endorsement of these INPO managed efforts as described this morning and outlined in the documents furnished with our testimony. We would be pleased to work with members of your staff, the Nuclear Regulatory Commission, and the Department of Energy to enhance and augment the structure I have described.

Subject to your questions, that concludes my testimony.

Senator MOYNIHAN. That is a very thorough set of statements, sir, and let me say that I hear you. We hear you very clearly on this matter.

I think, if it is all right with you—Admiral, is it?

Dr. PATE. I am a retired captain, Senator.

Senator MOYNIHAN. Captain, I am going to put the questions we have for you to two of the members of your board who follow next. I think I will get a very clear idea of the way you have gone about this. It is very impressive what you have done.

There are just a few questions that do nag us, which are what is a standard and how do we know what you are doing? So why don't I just excuse you with great respect and thanks, sir. We will hear from Dr. Remick and Mr. Carroll, who are your colleagues and whom we will call forward.

We welcome you both. I am going to start out by saying what I would like to ask of you in terms of Dr. Pate's testimony is what is the standard? How do you know if you have one? How do you know if it is a good enough one? How do you satisfy yourselves? How do you make it stick? And how do we, the public, know what is happening here? When you accredit, we know. When do you discredit? And how do you feel about what you are doing?

You are both very welcome. I think Dr. Remick is the first on our list, so we will ask you to proceed, sir.

STATEMENT OF FORREST J. REMICK, ASSOCIATE VICE PRESIDENT, PENNSYLVANIA STATE UNIVERSITY

Dr. REMICK. Thank you, Senator Moynihan. I am Forrest Remick, associate vice president for Research at Penn State University. I come before you this morning as a member of the National Nuclear Accrediting Board. However, before providing my remarks, I wish to briefly describe my background and experience because I think they are pertinent.

My involvement in the nuclear profession goes back 30 years. I received a reactor operator's license almost 29 years ago. Later I received the fourth senior reactor operator's license issued in the United States. I am very proud of that. Beginning in 1956, I developed nuclear laboratory and other courses for the training of operators of both domestic and foreign research and power reactors.

For 2 years I served as chief of the training section of the Department of Technical Assistance of the International Atomic Energy Agency located in Vienna, Austria.

For 14 years I served as a consultant reactor operator licensing examiner for both the AEC and the NRC. As a consultant I have conducted quality assurance audits of control room operation at power reactors in the United States.

In short, reactor operations and the training of nuclear facility personnel have been a very important part of my professional life.

It is from this background and perspective I would like to have my remarks received this morning.

I have not hesitated in the past to be a critic of reactor operations and training. For example, 10 years ago I was invited to provide the keynote address at the National Symposium on Training of Nuclear Facility Personnel. I entitled my address at that time "Training of Nuclear Facility Personnel, Boon or Boondoggle?" In that talk I was quite critical of a number of things.

One thing that I was particularly critical of was the fact that the training staff at many utilities at that time consisted primarily of one person, called the training coordinator. Unfortunately, that person was not always selected because he knew much about training, nor because he necessarily knew a lot about reactor operations. More than likely, the individual was selected because he was the person available and not needed for other duties. The classroom consisted mostly of any room available at the moment.

In that talk—and on many occasions since then—I was critical of the fact that reactor operation was not treated as a profession and that reactor operators were not treated as professionals. Dr. Ahearne quoted that earlier. I was critical about the lack of proper tools being made available for operators to use, particularly in a time of crisis. I complained that there were various human engineering considerations absent in the control room and in the plant.

At that national meeting 10 years ago, there were about 125 people in attendance. Many were from universities, national laboratories and consulting organizations.

Recently I was invited to participate as chairman of the opening session at the Sixth National Symposium on the Training of Nuclear Facility Personnel held in Nashville. At that symposium over 500 percent were in attendance, mostly professional utility training personnel.

Lest I give the wrong impression, there were numerous positive things I pointed out in that "Boon or Boondoggle" talk.

Later, following the the accident at TMI, when accreditation of the nuclear training programs was first suggested, I was not a strong proponent of the concept. At that time I could not see how accreditation itself could make the major impact on training programs that I thought was necessary. I was not against it, but I was not a proponent.

I believe that the reason I was nominated by the NRC to the National Nuclear Accrediting Board is because some of the NRC staff and several of the NRC Commissioners were aware of my operations and training background and interests as well as my efforts to make changes in operator licensing while serving as policy chief to the NRC Commissioners.

The point that I wish to make this morning is that a dramatic change in the training of nuclear facility personnel has taken place in the last several years.

For example, there has been a tremendous increase in the personnel resources that are being made available for training. No longer is there a sole training coordinator, assisted by some part-time help or consultants. Typically there are 15 to 40 or more members of the training staff depending on the number of units at the site. Instructors are supported by curriculum developers, instructional specialists, and librarians. There are now instructors for mechanical, electrical and instrumentation, and control maintenance. There are also training programs for technical staff and management personnel.

Further, there are extremely impressive changes that have taken place in facility resources. There are numerous and spacious classrooms, ample offices, libraries, plant specific simulators, and many types of instructional services. As a university professor, I cannot conceal my envy of these highly impressive facilities.

Of particular note are the facilities that are being developed for the training of mechanical maintenance, electrical maintenance and instrumentation and control technicians. It is my opinion that the formalization of these craft training programs will result in dramatic improvements in plant reliability over the coming years, an area where we have considerable room for improvement.

As a result of my involvement in the accrediting process, I have become a strong advocate for the systematic approach to training and to training that is performance based. I wish I had known about it 25 or 30 years ago. I believe it would have made me a much better university professor.

In the past year or so I have been invited on about a half dozen occasions to talk at national meetings on the nuclear accreditation process. At those meetings I Stressed the importance of quality in training if we are to achieve excellence in plant operations in this country. Further, I discussed how accreditation can be used in achieving quality in training programs.

On those occasions I have talked to plant personnel, to trainers, to plant managers, to nuclear vice presidents and to chief executive officers. In these interactions I have been sincerely impressed by the commitments that are being made and in the resources that are being made available to accomplish these improvements in training.

Of special importance, plant personnel and training personnel are increasingly proud of what they are accomplishing.

In the last several months I have had three invitations from utility personnel who remember my "Boon or Boondoggle" talk. They invited me to come and see their facilities and their programs. They are extremely proud of what they are doing and what they are accomplishing. On my part, I am extremely proud to be professionally involved in the process that I believe is contributing to these improvements.

Recently members of the National Nuclear Accrediting Board met with the NRC Commissioners. At that time I indicated that I am a supporter of the NRC process. I have been a part of that process and continue to be a part of it.

However, I pointed out that it is my sincere view that one could not have accomplished by the mandate of Federal regulations what is being accomplished by individual commitment, personal pride, and by peer pressure and assistance.

While participating in two technical information exchange visits to Japan—I just returned from one 2 days ago—the Japanese Government, industry and utility personnel stressed that they operate at a much higher level of cooperation and mutual trust than is the case in the United States. In my view, their phenomenal success in improving plant reliability is proof that improvements can be made absent adversarial relationships.

I told them that the NRC's decision to allow utilities to demonstrate what they can accomplish in the training area without additional regulatory requirements is precedent setting and hopefully might be the beginning of a more cooperative approach for the future. I would urge that Congress support the NRC and the industry in these cooperative efforts.

Thank you, Senator.

Senator MOYNIHAN. Thank you, sir. We are going to hear Mr. Carroll next. We will talk to you as a panel.

In my introductory remarks I made a comparison of a nuclear operator to a pilot of a 747 plane, the long hours of tedium, and then there are moments, more like seconds in the 747, when you have to think very fast and get it right the first time.

Mr. Carroll, we welcome you as a 747 pilot, I believe, and an executive and member of this board.

STATEMENT OF JOHN E. CARROLL, VICE PRESIDENT, TRAINING (RETIRED), UNITED AIR LINES

Mr. CARROLL. Thank you, Mr. Chairman.

I did retire from United Airlines in 1982 after 36 years with them. I was a qualified 747 captain at the time and held the position of vice president of flight standards and training and had held that position for the last 5 years with the company.

In addition to that exposure, I was also chairman of the ATA Flight Operations Committee and chairman of the International Air Transport Association Flight Operations Advisory Committee. With both of those assignments I had an even broader view in training and operations throughout the world.

In addition, I had a combination of 20 years active and reserve duty with the Air Force. Most of my exposure during that time was again in the operations and training field, having held the position of director of Operations and Training of the last unit to which I was assigned.

In late 1982, early after my retirement from United Airlines, I was approached by INPO and asked if I would participate in their Accrediting Board activities. I was to be the participant from outside of the industry representing a non-nuclear training organization.

In spite of my background, I was still a little nervous and hesitant about accepting that assignment because, just as you mentioned about yourself earlier in our deliberations here today, I had practically no knowledge of the nuclear industry and I did not want, as a neophyte to look less than intelligent in this participation.

However, these concerns that I had were partially allayed when I participated in early 1983 on an accreditation team visit to one of the nuclear powerplants. I recognized at that time very quickly, the similarities between the nuclear industry as far as training is concerned and the aviation industry. They had a systems approach to training. They were very thorough in the establishment of training programs and had extensive use of simulators.

In addition, I recognized that there was a need within the nuclear industry, just as there is within our cockpits, of the team working well together, getting more from the team than they could from any one individual involved. That was particularly interesting to me, (and I notice that it is in part of your bill,) because in the aviation industry 60 percent of all fatal accidents have had a human causal factor involved, and in the nuclear industry, in the significant events that Dr. Pate reviewed before, a large percentage of the significant events incorporate that same recognition.

Along those lines, the NTSB has recently recommended to the FAA that this kind of training be required in the aviation industry. United was I believe in the forefront of developing this program during my tenure with the company, and it is now proliferating around the world, although there is the "not-invented-here syndrome" on the part of a lot of companies in not wanting to pick up what other people have developed.

Counter to this, what I have discovered in the nuclear industry is that they are already pursuing the recognition of the need for this training and the diagnostic type training that was referred to earlier. I think therefore that this is something that will be accomplished much more quickly in the nuclear industry than it will be in the aviation industry.

These recognitions helped me to feel a little more comfortable, but I still did not feel I wanted to be a figurehead on the board due to a lack of background and awareness of the industry.

In an attempt to learn more about the industry by participating in these accreditation team visits, I also found the approach the accreditation team took was very thorough and very objective. The visits follow the requirement on the part of the utility of submitting a self-evaluation report that is premised on the objectives and criteria set forth by INPO, which to refer to one of your questions that you would like us to address, Senator, is where the "standards" come in. The objectives and criteria that are established are very thorough, very broad.

I find that in these self-evaluation reports they are having to address these objectives and criteria and so they are examining their conscience, if you will, as to how well they are doing in their training programs. When they submit that self-evaluation report, it is then followed up by a team visit, which I have participated in. At that time, as I say, I recognized the objectiveness of the accrediting teams. I recognized the thoroughness with which they approached these things by requiring programs to be outlined completely in lesson plans, staffing, equipment, facilities and the feedback process. And the feedback process to my mind is a major point in the effectiveness of these programs.

The feedback process requires the supervisors to report on the expertise that the operators now have in the control room or in the other maintenance areas back to the training program managers. This feedback may give the recognition of a need for adjustments in the program.

In addition, which I think is also a very strong point, the individual is asked to assess his feeling about his capability to operate in the environment as a result of the training he received and whether he recognizes any deficiencies. He would then feed back this need to be incorporated into the program for future trainees.

One of the things that also enabled me to recognize the material I was going to have to refer to as an accrediting board member as being very reliable and thorough and a valuable set of statistics or information, was that during these accrediting teams visits, they conduct team meetings every evening after their 8- or 10-hour days, and reassess the concerns that they perhaps approached this facility with in the first place. They then reprioritize their attention for the following days and therefore come up with a very thorough and extensive report for the chief operating officer.

The accreditation process, as far as my awareness is concerned, is very unique. It is something that the aviation industry does not have and I think would benefit them if they did have such a process. It is one which incorporates a self-examination that is very thorough and very pridefully done and counter to what we do in the aviation industry. They try in the aviation industry to be unique in their own environment. While they follow what the FAA expects, they nevertheless want to do it in their own way.

The INPO enforcement process, the objectives and criteria are such that everyone must adhere to the same set of standards. And the significant stigma that is attached to not being accredited they recognize as something they do not wish to have ascribed to them.

Senator MOYNIHAN. Stop right there, Captain. Just to interrupt you, not stop you. Has anyone ever not been accredited?

Mr. CARROLL. Yes, sir. We just recently deferred a program. We do not call it "discredited." But we do defer them.

Senator MOYNIHAN. What happens?

Mr. CARROLL. They have to go back and address the concerns we evidence about the program and then resubmit it for accreditation. That is something that they do not react to favorably.

Senator MOYNIHAN. How do you flunk?

Mr. CARROLL. Sir?

Senator MOYNIHAN. How do you flunk out? How are you made to close down?

Mr. CARROLL. By not meeting the objectives and criteria that are set forth in the INPO outline.

Senator **Moynihan**. It hasn't happened yet. Maybe it is a sign that this program works. But you have deferred. You said to someone, "No, you didn't pass."

Mr. **Carroll**. That is correct.

Senator **Moynihan**. "Now do it right."

Captain, do you want to join your colleagues here?

Dr. **Pate**. I would like to just briefly address that question and then go back to my seat.

If the accrediting board, which is set up independent of INPO, defers accreditation and the utility doesn't correct that problem, if they come up again and get deferred again, ultimately in that process, if they don't get their training accredited, then they get suspended from membership in INPO.

Senator **Moynihan**. That hasn't happened, but that could happen.

Dr. **Pate**. No, sir. We have that authority from the board of directors.

Senator **Moynihan**. But does the public know when a deferral takes place?

Dr. **Pate**. Not necessarily. But the public would certainly know if a suspension took place as would the financial community, the insures, and the Nuclear Regulatory Commission.

Senator **Moynihan**. Would you have the goodness to provide the committee with that precise process and some data on how many times? I see your able colleague back there taking notes. We haven't gotten your name for the record. You are taking notes on what you have to get.

Dr. **Pate**. Yes. This is Miss Angie Howard, who is director of one of our divisions.

Senator **Moynihan**. We welcome you to the committee. We would like to have some data on that.

Dr. **Pate**. Yes, sir. That is provided in part in my written statement, but we will provide you with additional information.

Mr. **Carroll**. As a member of the accrediting board, my participation in these teams, as I said, has been both educational but also revealing from the standpoint of the recognition that when they submit a report to us, we can have the confidence they have gone into the process very thoroughly and the material we are going to have to assess is as good as we can get and it is not something that they have not looked into very thoroughly.

As a result also of these team visits, we find that consideration of a particular utility finds us in possession of an accrediting board member who has been at that facility and on the team visit itself. It gives us even more firsthand recognition of what should be of concern, if anything, at that facility.

Even though I have a broad background in the training area, both military and commercial, I have been very impressed with the approach taken in the nuclear industry. I am confident that the programs that are brought to us for accreditation are meant to be of the highest standards and to fulfill all of the objectives and criteria that are being applied.

I attribute this in part to INPO's efforts, but also, as I recognized over the last 2 years, the growing commitment that the industry has to provide us with professional programs to assess.

Senator MOYNIHAN. I think no two more important witnesses would appear this morning than you, Dr. Remick, and you, Captain Carroll. You were a critic of this process. You raised this issue forcefully as a university professor, before you moved on.

You come in from a whole different world but with transferable perceptions. You are telling people who are working at their training or not. You both are telling people this is working and it is in good shape.

Now, two questions. What did you mean, Dr. Remick, when you said that in Japan—always Japan these days—they have less of an adversarial pattern? We hear about this. Are they more successful?

Let me ask you another question. When we run around 60 percent of capacity, is that telling us something about how well we are running these plants?

Dr. REMICK. Yes, sir. If one compares the figures that Dr. Pate was using for availability, which for most nuclear plants is a parameter very close to capacity factor, there is a difference. Where he was showing about 60 percent for the United States, the Japanese are showing 70 to 74 percent, with a national goal basically of 75 percent. Unquestionably they will reach it.

We are talking about reducing scrams in the United States and coming down to a couple of scrams per unit per year. I visited the Japanese Fukushima Daiichi site. They have six units at the site. They had gone 575 days without a scram in any of the six units. We are talking about getting down to about three and a half per unit per year in the United States. They have gone a year and a half at that site without one scram for six units.

They are taking U.S. technology, plants that initially were developed in the United States and are now manufactured in Japan and getting excellent result. They have a cooperative thrust involving government and industry. Their regulator is also the government promoter.

Senator MOYNIHAN. Let me tell you, nobody was in cowboy boots in those places, right?

Dr. REMICK. That could be.

Excuse me, sir. I understand what you are saying. Absolutely not. You can tell a vendor person by the color of the uniform he is wearing and you can tell a utility person.

I have for a long time, for 10 years, stressed professionalism in reactor operations. I am amazed to go to Japan and see that they have far exceeded my dreams in that area. Individuals can be identified by the color of their neat uniforms, helmets, and so forth.

Senator MOYNIHAN. They are color coded.

Dr. REMICK. Yes. Also, the people that handed me the wire basket that I put my street clothes in while putting on protective clothes wore a dress shirt and tie and a blazer. There was classical music on the PA system and rugs on the floor and everything was spotless.

Senator MOYNIHAN. Would you ever see anybody in blue jeans at a cockpit of a 747? No.

Mr. CARROLL. No, not quite that extreme.

Senator MOYNIHAN. You are dressed up to say "Listen, I am an important person. I have an important job and people are depending on me."

Dr. **Remick.** But they do work together cooperatively. When they have a problem, it isn't thou shalt do this. They get their experts together and they mutually seek a solution. They don't dictate by promulgating more regulations. It is more of a cooperative approach using the best expertise they can pull together from wherever it exists.

Senator **Moynihan.** There is something about the Japanese. I want to see if I can get you right. I want to know what you are telling the committee. We are going to pour over this and come back to you. If we have this average, what is it, the significant events, the unplanned automatic scrams at three and a half a year, your 6.4 is critical, which means while in operation, what is that telling us? Is that telling us the plants aren't designed right, maintained right, or operated right?

Dr. **Remick.** I would guess that in my view it is more of the maintained properly. The reason they want to reduce those scrams is public acceptance. They realize that the public might misunderstanding when a plant has a scram and think that there was some danger. There may or may not have been. So they have decided we are going to reduce those numbers of scrams by maintaining those plants and training their personnel.

Senator **Moynihan.** The business out in Toledo was a scram and it worked. Nobody got hurt. The machine was working. It turns out the machine was working and the operators kind of got it mixed up, I guess. In any event, it was a TMI, and that was their sensible perception.

Captain, did you want to say something?

Dr. **Pate.** Just to add that other countries, for example Sweden, have a history of scrams more on a pattern like the United States. They do a little better. I think the French plants are about the same.

A scram is a reactor shutdown to protect the plant. It is not one of those things you try to drive to zero, because you may not get one that you need. The average in the United States was too high. So we need that continuing progress.

The other thing I think should be taken into account is that the Japanese don't do some testing while operating that the U.S. plants do. So that tends to distort the comparison a little bit. No question the Japanese manage that part of their activity better than the United States. But the point here is the U.S. plants have made quite a bit of progress in that important area.

Senator **Moynihan.** I guess at one level a scram is a mark that the system is working.

Dr. **Remick.** That is correct.

Senator **Moynihan.** At another level, it is not working perfectly or it wouldn't be necessary. On the other hand, if you went year in and year out with zero scrams, it might turn out your system is in fact not working at all and you have been lucky.

Dr. **Pate.** Exactly, Senator. That is a good assessment of how to weigh that particular measure.

Senator **Moynihan.** All right. You think the present arrangement in place is a good one? It certainly is a very different one when you wrote "Boon or Boondoggle."

Dr. **Remick**. Absolutely. Senator, I think the accreditation process is off to an excellent start. The results today have impressed me. I have been surprised at the success. I can't say that it is an absolutely perfect system. Like any accreditation process, when you accredit university engineer programs, you cannot assure that you are going to turn out an engineer who is always a successful engineer. No system is perfect.

But the point that I would like to make is that there have been tremendous changes. I think we have a process that is off to a good start. I urge that it be given a chance to prove itself.

Senator **Moynihan**. This notion came to us about the same time the notion of INPO came to you all. But I still would like to know more about how we find out when you find out that something is not working to your satisfaction, that people aren't getting accredited. How are we going to know? We have no other thing. The U.S. Government is pretty open in these things. That is why we are having public hearings here.

Dr. **Remick**. Senator, I assume you know the NRC sends observers to the accrediting board meetings. They have attended all but the last one. They do not participate in our executive session, nor does the President of INPO participate in that. That is a closed session of the board. But the NRC is fully aware of board actions. The NRC, of course, has the Government oversight responsibility.

Senator **Moynihan**. Sure. Maybe we should ask the NRC for its judgment. This is the problem. We haven't got this quite straightened out. Captain?

Mr. **Carroll**. I would like to address that for just a second, Senator. I think a distinction ought to be made that it is not a failure on the part of the utility to look at it from the standpoint they are a bad utility and are not operating correctly. Their program at that point has not been formulated, followed through, proven, whatever, whatever deficiency we might find, to the extent that we would like to see it. It doesn't mean they are an unsafe plant.

Senator **Moynihan**. Yes, sir. Right.

Mr. **Carroll**. From the same standpoint, on reporting when this happens, if I can draw the analogy to the aviation industry, if we submit a training program to the FAA for their approval and they do not approve it, then we have to go back and address the areas they tell us are not meeting the requirements they have and then we are given approval.

Senator **Moynihan**. It doesn't mean you are falling out of the skies all over O'Hare Airfield.

Mr. **Carroll**. Hopefully.

Senator **Moynihan**. Their decision not to approve your plan doesn't mean you have to ground your flights.

Mr. **Carroll**. It means we have to do a little better and then they will approve it.

Senator **Moynihan**. OK, that is good.

Mr. **Carroll**. So for the public to know that a particular part is unacceptable—as an example, if a pilot in his recurrent training and checking doesn't pass, we don't immediately have to submit that to the newspapers and tell them the name of the captain who didn't pass. We put him back in training until he does pass and then put him back in operation.

Senator **Moynihan**. If you are flying with captain so-and-so, you should know he flunked his 5-year retraining.

Mr. **Carroll**. You don't put that on the door of the airplane as you come in, no.

Senator **Moynihan**. All right. We are getting a lot closer to this. But I do know that it is FAA approved in the case of the pilot training.

Mr. **Carroll**. That I think is taking place right now, Senator. NRC has allowed INPO to do this accrediting program approach, but with the recognition they better do it right or they will stop them from doing it.

Senator **Moynihan**. And the NRC is on the board.

Mr. **Carroll**. They have nominated representatives for the board, that is correct.

Senator **Moynihan**. Captain?

Dr. **Pate**. If I could just make one more point, Senator. I am personally very pleased that you are interested in this matter and that you are giving us a chance to tell our story. One of the things that does trouble me is the manpower supply into the industry over the next several years. I know that relates to your interest and your bill. It is the manpower supply of young engineers into many disciplines: managers, operators, technicians, and so on, the degreed personnel who go into colleges and universities in this country and get a degree in nuclear engineering or health physics or a related field that I want to address. That was the subject earlier.

INPO operates a scholarship/fellowship program. We give 200 undergraduate scholarships a year and 40 graduate fellowships. Those are oversubscribed. We have several applicants for each position.

The DOE gives 75 graduate fellowships and 10 undergraduate scholarships.

Senator **Moynihan**. Captain, the reason they are oversubscribed is the Reagan administration has cut out all of the scholarship funds from the Federal Government.

Dr. **Pate**. Yes, sir.

Senator **Moynihan**. Any time you put up scholarship money, you will have a friend in this committee.

Dr. **Pate**. Thank you, sir.

Senator **Moynihan**. Thank you very much, gentlemen.

Now a final panel, which I hope people will stay for. We are very honored to have Dr. Manuel Kanter of the Argonne National Laboratories and Lynn Weaver of the Auburn University.

Gentlemen, we welcome you, to come here out of your fields of expertise, because by definition you are both experts at just about everything. It is going to be very helpful for us to hear from you.

Dr. Kanter, you are first on our list, and then, Dean Weaver, you are the last. We welcome you, sir.

STATEMENT OF MANUEL A. KANTER, ARGONNE NATIONAL LABORATORIES

Dr. **Kanter**. Senator, before I get into the substance of my testimony, I would like to indicate to you that I have been the head of the Nuclear Power Training Program at Argonne National Laboratories for the past 10 years. This training is presented to middle management and lead technical people from countries with power programs. It is a program carried out under an agreement of cooperation between the International Atomic Energy Agency and our Government. In that role I have organized some 30 courses here and some 11 abroad. More than 50 percent of them have been in safety fields.

Senator MOYNIHAN. That is no small exercise. I know that Dr. Remick worked in Vienna a bit. We depend more on IAEA than most people recognize, except a few people such as yourself.

Dr. KANTER. I have had the pleasure of associating with Dr. Remick in many ways during the past years. In those courses we have utilized over 1,000 experts from utilities, consultants, our government, the NRC, and universities, both domestic and foreign. In that way I have had the opportunity to get a very good oversight as to what goes on in the training of nuclear power plant people.

I very much appreciate the opportunity to present the insights I have gained this way, both to the committee and perhaps through these hearings to the U.S. industry.

My general observation is that the training of nuclear powerplant operators per se is really quite adequate, to the function that they perform. It continues to be upgraded under the criteria of the NRC and by the actions of the electric utility industry through INPO. You have heard all about that here.

I think I agree with the industry position, and perhaps disagree a bit with yours, that the job is a routine one and that the kind of conceptual background that is needed in nuclear plant operation is really not going to be attained by the person who has that job of turning the dials 7 days a week, three shifts, et cetera.

For that reason, I guess I am in basic opposition to the bill for a national academy to train operators and senior operators.

However, I do see a role for a national academy in providing training to supervisors and engineers who should be in a position to readily back up the operators in unusual circumstances.

INPO recommendations for the function of shift technical adviser, a new position that has been mandated by the NRC since TMI, describes the needs very well. They also indicate that the shift technical advisers are not the only people who need the ability and the knowledge to back up the plant operator.

The kind of person that we are talking about really must be able to relate the analysis that is part of the nuclear plant design to the operational aspects of that plant. It means understanding the bases of the many technical specifications that are set forth by the vendors and accepted by the U.S. Nuclear Regulatory Commission.

Of particular importance is a working knowledge of reliability analysis techniques by which one recognizes the probabilities of the certain alternate trains of events that could follow some plant upset, and which gives you get a guidance for actions to mitigate the results of such initiating events.

Ideally, this kind of diagnosis is done by computer and built into the instrumentation and control of the plant. But experience and perhaps intuition in the aircraft and space area have indicated a need to have a human in position to compensate for some failure in the computer or something that the computer was not programmed to compensate for. It is this kind of back-up person who can conceptualize and translate the analysis that has been built into the plant into something operational, is whom I think we should have a national academy to train.

That kind of training would presuppose an engineering degree, some knowledge of the plant systems, and experience in plant operation or design. The special training that the national academy would provide would have three components superimposed on that background: applied fundamentals, advanced operational analysis, and exact plant simulation.

The applied fundamentals training should stress the applications of the principles that are usually taught in academic courses to nuclear plant practice. The training would assume that a basic knowledge of these fundamentals has been received in a bachelor's degree program in engineering. The details are in the exhibit. I won't go into them here. I would point out that INPO has recommended this kind of training for the shift technical adviser and other technical staff, but the detailed guidelines have not been developed and the time allotments are not sufficient. Also, this training is only available in some of the areas. I do know that several utilities, particularly GPU and Seabrook, have arranged for parts of this training through universities. But again, I think if there were an academy that would make this kind of training available to all, it would be a definite improvement.

Probably most important is what I call advanced operational analysis which concerns itself with developing the ability to analyze transients in the nuclear systems.

Senator MOYNIHAN. Transients, when you say that, you mean what?

Dr. KANTER. The things that happen in a plant which are not the steady state. Something happens.

Senator MOYNIHAN. Something has gone through the system that is not expected.

Dr. KANTER. That is right. The ability to diagnose those kinds of things.

And again, I have some details of that training in my written testimony. Again, the INPO guidelines have focused on the human factors and the managerial aspects of the subject but not on the analysis. They indicate there needs to be training in this analytical area. They indicate some 40 contact hours whereas. I think it is a matter of months.

As far as exact plant simulator training, that may or may not be necessary depending on the experience that the trainee would bring to the academy.

Finally I would like to say that because there has been little movement by the industry in response to those guidelines for this purpose, I would favor the establishment of a national academy. The structure envisioned in Senate bill 16 seems appropriate to the purpose and should be able to be carried out by contract to appropriate organizations, rather than by setting up a bricks and mortar institution.

Something that has come to me since I prepared the written testimony is that an advantage of having a national academy rather than an industry sponsored academy would be that it could be made available to the NRC which could utilize this kind of training as it replaces experienced staff.

To be effective, the faculty has to be prestigious, the program stringent, and extensive—perhaps as long as 9 months—so that graduation from this program would be recognized without any formal certification. I will go back to the old Oak Ridge School of Reactor Technology. Everybody who was anybody in the industry went to it. None gave them tests. No one said you had to be a graduate to perform.

I think we could also look to France for what they have done in establishing training for a position they call safety engineer, a man who is put in a position to take over the operation of the plant any time he sees something unusual.

In conclusion, I support the establishment of a national safety academy dedicated to providing a high level of training for the technical personnel who support the operations and maintenance, but I am opposed to having that academy train the actual operators themselves.

I would like to point out that is my opinion, not the Argonne National Laboratory.

Senator MOYNIHAN. You do not have a reputation for giving institutional opinions, Dr. Kanter.

Dr. KANTER. Thank you, sir.

Senator MOYNIHAN. Thank you very much.

We will now hear from Dean Weaver.

STATEMENT OF LYNN WEAVER, DEAN, SCHOOL OF ENGINEERING, AUBURN UNIVERSITY

Dr. WEAVER. My name is Lynn Weaver. I am dean of the college of engineering at Auburn University. I have 29 years of experience in engineering education, 22 of which have been in nuclear engineering.

I would like to comment on what Dr. Pate said a moment ago in relation to the need to encourage more young people into the nuclear engineering profession.

INPO, through its effort in providing scholarships is going a long way in doing just that. But the problem is much deeper. I was director of the school of nuclear engineering and health physics at Georgia Tech for 10 years. That program has diminished considerably and could possibly be phased out of the university, because of the demands on limited resources and the competition with other engineering disciplines which have much larger enrollments. The university administration questions whether or not they can afford to support programs in nuclear engineering.

The State of Georgia is a user of nuclear energy, with two plants in operation and two more coming on line sometime in the latter part of the 1980's. Unless something is done to somehow provide resources to the universities to continue educating nuclear engineers, we are going to lose that very critical element of our program.

I think your committee needs to address this issue. It is one that cannot be solved overnight. Once these programs are phased out of the universities, it is very difficult to put them back in. Attention must be given to make sure that engineering talent is forthcoming to meet the needs of this industry.

I thank Dr. Pate for raising this issue, and I am glad to have an opportunity to articulate my concerns.

Senator MOYNIHAN. Spoken like a dean.

Dr. WEAVER. Absolutely.

I would also like to add another comment. In 1979, right after TMI, I served on a task force put together by the Southern Co. to review the safety of operation of the Southern Electric Co. nuclear system. Like you, I was appalled at the salary being paid at various levels of plant operations, from the plant manager on down. With the amount of responsibility that the plant manager has, and at all levels of management and operation of the plant, the pay was far too low.

I made comments at several of our meetings about this concern. Things, of course, have changed in the industry since then. You get what you pay for.

I would like to read some of my prepared remarks relative to the proposed training act.

As has been demonstrated in the past, these hearings today are concerned with a very critical component of the overall plan for nuclear power safety. There is no question in my mind that a centralized training facility for licensed personnel concerned with operation of nuclear powerplants would provide for uniformity in areas of instruction, screening of applicants, prerequisite educational level of attendees and quality of instruction.

This concept does create problems in the current generation of nuclear powerplants operated by utilities. The proposed academy could provide the fundamental instruction in the various aspects of nuclear powerplant operation; however, a sizable fraction of the training must be carried out at the powerplant site, due to the diversity in design and operation of nuclear powerplants. This diversity would make it difficult to provide, in a central facility, the hands-on experience that is vital to an effective training program.

If the design of the next generation of nuclear powerplants is standardized, then serious consideration should be given to establishing central or regional training facilities to insure the highest quality of instruction obtainable, rather than a number of separate training facilities, even though they have gone through the accrediting process. I would like to give this analogy.

We have over 200 colleges of engineering that are accredited in various aspects of engineering education. However, if you review these programs you will find that the range in quality is dramatic, even though minimum standards have been met.

Given the present situation, the initiative taken by the industry through the Institute of Nuclear Power Operations and the National Nuclear Accrediting Board, if carried out properly, can provide the level and quality of training to guarantee safe operation of nuclear plants. It is important that the industry continually assess and seek ways to improve the quality of instruction in their training programs. A concerted effort must be made to assure that all utility training programs are on a comparable level. This is key.

Senator Moynihan. All right. This is just coming toward some end. The process sometimes produces thought.

Is it your thought, Mr. Weaver, that we are going to get into a new generation of powerplants that will have a much more standard system?

Dr. Weaver. The industry is trying to move in that direction. I certainly hope it does.

Senator Moynihan. I think some of them do. I think at the Shoreham right now some wish they had ordered the product from Sears & Roebuck or Argonne Laboratories.

All right. I hear something here. The technique of training operators, when you put your mind to it, is learned, it is teachable. It is doable. It has been done. We know how to do these things. We weren't, obviously, doing it before TMI. Nobody got hurt.

Dr. Weaver. We were lucky.

Senator Moynihan. We were lucky. A utility got hurt.

Dr. Weaver. If I may inject this comment: Before TMI, I think the problem is the utility relied heavily upon Navy nuclear power operators. A 3,000-megawatt nuclear plant is different than a powerplant that powers a nuclear submarine, which is about 80 to 100 megawatts, or so.

Senator Moynihan. Would you give me that slower?

Dr. Weaver. My point is that the industry relied heavily upon nuclear Navy trained personnel, and certainly the Navy has a good program. But I submit that a 3,000-megawatt nuclear plant is different than a powerplant that powers a nuclear submarine, which is about 80 to 100 megawatts or so. It is a different beast, and a different set of problems come into play.

Senator Moynihan. Yes. Dr. Kanter, you are describing a particular type of profession, the old line of the Hebrews, "Those who understand, understand," and people who will have a feeling for this. It is more than a machine. It is alive. It has nuclear chain reactions going on. And when dials look funny and something transient is going on in this system, he can have a sense of it beyond that of a well-trained operator who might very clearly know he has something wrong without having that extra dimension of imagining what it might be that is wrong.

That is something which sort of forms institutionalized genius, which education somehow sometimes produces. The French have this safety engineer. The French Government owns all those things, doesn't it?

Dr. Kanter. Yes. It is easier for them in France, no question about it.

Senator Moynihan. An invention might be an NRC person on the site who is a safety engineer who can say "All right, I take over command at this point," or something at that point. I am not suggesting that. But you are arguing a person who it just takes a high level of intelligence to keep interested in all of those hours when nothing is happening but when something goes wrong can take change. That is what you are looking at, that kind of person.

Dr. Kanter. I must say that that kind of job is outlined quite well in the INPO guidelines for shift technical advisor.

Senator Moynihan. That is what you are talking about, yes.

Dr. **Kanter**. The point is that this person who, doesn't have routine duties. He is out there trouble shooting. Looking at why does that thermometer always showing a high reading? He has the time to go into that and hopefully figure them out.

Senator **Moynihan**. This fellow has to be half a scientist.

Dr. **Kanter**. Yes.

Senator **Moynihan**. And half an engineer and half, what do they say, a rambling wreck from Georgia Tech. I mean all those things.

That is the kind of teaching which takes place in really good engineering schools. And you can't ask an industry based organization to do that kind of teaching because it is not training, it is teaching. Am I onto something here?

Dr. **Weaver**. Yes.

Senator **Moynihan**. That possibly is the role of the Federal Government in supporting. Now, obviously, don't get it in anybody's mind we are going to build a building somewhere and call it the National Nuclear Safety Engineering Academy. No. But a program probably in one campus. I don't know how many people. We only have 90 of these plants, so you probably at any given time are looking for 400, 500 of these people.

The NRC needs them, too, don't they, more than almost the plants need them. The NRC has to have people who are head of this. You have to cycle people through this place, don't you?

Dr. **Kanter**. Right.

Senator **Moynihan**. Particularly if you start a new generation of plants. I have begun to think I see what we are looking for. First of all, it has to be based in a university somewhere. I mean because it can't live on itself. It has to live in a university setting. It has to live near science. It is basically engineering that has to live very close to science, right? And close to physics.

Dr. **Kanter**. Yes.

Senator **Moynihan**. I have begun to think that we have to talk to the NRC about this, about their needs, how they feel they get their own people trained and cycled. You must sense that somehow.

Dr. **Kanter**. Yes. I get into that a bit because I get into sending people from foreign countries to the NRC schools.

Senator **Moynihan**. What are the NRC schools?

Dr. **Kanter**. They train NRC inspectors in concrete technology, electrical, instrumentation and control. They teach existing technology. They don't get out into hands-on training.

I have been particularly interested that a program NRC has been running to teach their people this reliability analysis I talk about. They don't make anybody ever sit down and do it. They sit and listen in classes.

Senator **Moynihan**. Oh, yes, I see. What do you call it? The transient analysis with simulation.

Dr. **Kanter**. Yes.

Senator **Moynihan**. When you have a .001 probability of any event, then a whole chain of events, that kind of thing.

Dr. **Kanter**. Right; recognizing there is a chain and this event could initiate a sequence.

Senator **Moynihan**. OK, I think I have a little better sense of how this works.

There is a role for international cooperation here, isn't there?

Dr. **Kanter**. Yes.

Senator **Moynihan**. If we are going to sell plants abroad, we should train some of the people who can help run them. We have this extraordinary program. I don't think anybody knows how much we depend on those 40 Swiss and Danish inspectors in the IAEA who wander around the world and sniff around plants. I mean if you ask is there any plutonium missing here, the answer is always no, no plutonium missing here. Right?

Dr. **Kanter**. Right.

Senator **Moynihan**. But the art of it is to sniff around and say I feel there is some plutonium missing here.

Dr. **Kanter**. I broke into the training business through training such inspectors 15 years ago.

Senator **Moynihan**. Yes, and that is more than just checking the locks.

Dr. **Kanter**. Yes.

Senator **Moynihan**. There is another dimension that is essential.

Listen, you have told us so much more, all of you have told us so much more before the start. We are going to print this volume and ask you to correct your transcripts, which, if you don't know, will surprise you how infrequently you speak in sentences.

We are going to pursue this question. It is not an adversarial pursuit. It is a cooperative one. And with any success, we will have some answers.

We are going to be obviously talking about a reorganization of NRC, and it is in this context that this was to be the second day of our hearings. Our distinguished chairman has had just too many other duties, too many places he had to be. He couldn't be here at all yesterday. We could only open up today.

I would like to thank Dr. Charles Richmond who has been the principal technical and policy advisor to the committee. I thank our indefatigable recording secretary. And thank you all.

The hearing is closed.

[Whereupon, at 12:55 p.m., the subcommittee was recessed, to reconvene subject to the call of the Chair.]

[Statements submitted for the record, reponses to additional questions, and the bills, S. 16 and S. 836, follow:]

TESTIMONY BEFORE
THE SUBCOMMITTEE ON NUCLEAR REGULATION
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

JUNE 27, 1985

BY

JOHN F. AHEARNE
VICE PRESIDENT
RESOURCES FOR THE FUTURE

Thank you for the opportunity to appear before you this morning to comment on issues relating to the education and training of nuclear power plant personnel. In his letter of invitation, Senator Simpson wrote "The Subcommittee would be particularly interested in hearing your views on the education and training of nuclear power plant personnel. Your comments on the current approach would be welcome, as would your thoughts on S. 16 [National Nuclear Power Plant Personnel Training Act of 1985] or other possible improvements that might enhance our ability to run a safe nuclear power industry."

The subject of proper education and standards for nuclear power plant personnel was of great interest to me during my five years on the Nuclear Regulatory Commission. There was no subject that caused me greater frustration. It was one in which I became interested quite soon in my term at the NRC as a result of some of the studies of the Three Mile Island accident. For example, on October 4, 1979, I requested the Executive Director for Operations (EDO) to consider arranging for an "outside organization to provide a thorough assessment of what needs to be done to significantly upgrade our licensing requirements for reactor operators." I referenced a 1979 ACRS report, "Review of License Event Reports": "Human errors in the design, operation and maintenance of reactor components and systems represent a significant source of LER's. Up to 50% of all failures appear to be attributable to this source. Contributing factors include the use of inadequate instructions, procedures and/or guides; a lack of adequate attention to man/machine interfaces so as to reduce the probability of error; and the use of improperly trained personnel."

In this memo I requested the EDO consider a study covering twenty-two items, including overseas practices for qualification of operators; applicability of some of the U.S. Navy approaches; and compensation and status of operators compared to other high technology fields where similar responsibilities are exercised. (A copy of this memo is attached.)

The NRC did request information from many foreign countries and produced a report in 1981 on foreign training requirements. Of fifteen countries providing information, eight countries indicated requirements for technical training for reactor operators. Thirteen countries required education beyond a high school degree. These countries included the United Kingdom, Federal Republic of Germany, Canada, and Sweden. In addition, eight of the sixteen countries responding required a university degree for senior reactor operators and nine of fourteen countries responding required a university degree for shift supervisors. ["Results of Survey of Foreign Reactor Operator Qualifications, Training, and Staffing Requirements" (Draft Report) August 1981]

During my time on the Commission, I met with representatives from nearly every country that had operating nuclear reactors or reactors under construction or were planning to construct nuclear reactors. One topic I always raised was the question of education and training requirements for reactor operators. Uniformly, these representatives believed that reactor operators ought to be extremely well-trained, highly competent, and usually would prefer university degreed people.

The NRC also had a "peer review panel" examine reactor operator qualifications. This panel reported back in 1982. (SECY-82-162: "Report from the Reactor Operator Qualifications Peer Review Panel," April 15, 1982) They did not conclude that bachelor degree requirements should be placed on the reactor operator or the senior reactor operator. However, their conclusions seemed to be based either (1) on a lack of a task analysis showing that the knowledge requirements for the operator's job required a baccalaureate degree or (2) that an operator's job would not retain interest. The panel said, "The shift-work nature of the positions in question lacks appeal in general, and are not especially likely to appeal to baccalaureate level engineers." However, they then went on to recommend a new position called a "shift engineer" with an education requirement of a baccalaureate in engineering. This position would be viewed as a career step rather than a career goal, and consequently, "it should be part of an attractive career path." A consultant to that panel was Paul Shoop, the International Representative of the International Brotherhood of Electrical Workers. In a 1981 report ("Position Paper for the U.S. Nuclear Regulatory Commission Reactor Operator Qualifications Peer Review Panel," November, 1981) while understandably in support of union goals and activities, he did include a few statements indicating the necessity for significantly upgrading operator education. For example: "The present state of training at the Nuclear Stations leaves much to be desired. The shot-gun approach to training at the Nuclear Stations is not working. Comprehensive, standardized training programs of a lengthy nature are needed." And also: "Education is definitely needed. Especially a well-coordinated educational program that all licensees use. Quality education is the key."

(I must note that Mr. Shoop was urging an apprentice program, as he went on to say, "An educational system is in place that is an alternative to the four-year degree proposal. This is a four-year apprentice program.")

I have long advocated requiring an engineering degree for reactor operators. My analogy has always been the airline industry. Perhaps this comes from my many years in the Air Force and contact with requirements for pilots, but I think there are strong similarities. The job of a pilot has sometimes been described as hours of tedium separated by seconds of terror. The point is that flying an airplane is in general an undemanding task once one has learned to master flight, instruments, and coordination. However, there are occasional circumstances, such as all but one engine on a multi-engine jet going out on take-off, in which great pilot skill is required. It is for this reason that pilots are carefully selected. Many members of the public are at risk in such a situation, because of the large numbers of passengers that aircraft can now carry and because many airports are located close to cities such that a crash has the potential of causing signficant loss of lives on the ground. There also is potential of great financial loss to the company. I do not know whether these are weighed equally or one is weighed more than the other, however, I do know that the result is that airline pilots are highly paid and carefully selected individuals.

The utility industry has not, to put it mildly, agreed with my approach. And the frustration that I spoke of earlier was really due to the many conversations both in Commission meetings and private conversations that I've had over the years with people associated with the nuclear industry. They have constantly taken the position that any high school graduate, given appropriate training, is quite capable of being a reactor operator. There are several elements of this argument:

-- the work is too dull, too tedious, for a more highly trained individual to stay on it very long.

-- once you have an individual that has gone through the training program, you would like that person to make a career in the control room.

-- everyone should have the opportunity to become a reactor operator if they want to, and they should not be screened out on artificial grounds such as education.

-- if you did put in a requirement for a college degree, the current operators, for the most part, would either be uninterested in, or unable to get a college degree. Therefore, you would lose these operators.

-- if you grandfathered the current set of operators, they would feel bitter when the new crop came in, or inadequate, or give the new crop substantial difficulty and problems.

-- there's no proven requirement that you need an engineering degree for the job.

These arguments were not very convincing to me. I did suspect that they were at least partially driven by the belief that it would be inappropriate for operating personnel to be receiving salaries higher than mid-level management people. However, in the free market society of the

United States, the way that you attract more highly qualified people and keep them in jobs is by paying them more money.

My views were summarized in an article I wrote published in the Annual Review of Energy in 1983 ("Prospects for the U.S. Nuclear Reactor Industry") in which I tried to summarize the lessons that I had learned over the five years in the Nuclear Regulatory Commission about the problems of nuclear power and where it was going. The following is from my conclusion:

> Nuclear power is a dangerous, complicated technology but one that can be handled safely--by competent people. Running a nuclear power plant requires understanding the plant, which requires technical training. To manage a nuclear utility also requires technical training. Many of the problems that afflict the nuclear industry in the United States arose because the people making management decisions in the nuclear utilities were bright lawyers, accountants, and businessmen, but poor engineers. Likewise, all engineers do not make good managers, nor can they all understand the economic and legal aspects of managing a utility. However, utilities have their priorities reversed in selecting managers with no technical background. This weakness has plagued the industry.
>
> Another area where the industry has been incredibly shortsighted is in choice of operating personnel. The industry has continued to believe that operating personnel should be high school graduates whom the utilities train--because, according to the utilities, operating a plant is a boring job. The utility exposes not only people in the area around the plant to risk but also the financial survival of the utility itself. Furthermore, they place this risk in the hands of a few people who have only a high school education and company training. Utilities should treat their operating crews much as the airlines treat their pilots, copilots, and flight engineers--as highly paid individuals who must, if necessary, be given special treatment.

As you can see from that description, I believe the issue of technical training is critical, not only for the operators, but also for the managers of nuclear power plants. In this I share the belief of Admiral Rickover who has stressed the need for technical understanding of technical operations. I do not claim to know that an engineering degree is required to operate a nuclear power plant. I do know from my experience and association with many high technology areas, both in the Defense Department and the nuclear industry, that understanding how a system works is a major help in reacting to a problem in that system. I would not stop at requiring merely technical training, but I would also go on to measure in some way the ability to respond under stress, since many individuals, even those who are quite knowledgeable, do not behave well under stress.

With respect to the specifics of the Senate bill, I agree with the findings laid out in Section 101. Whether a National Academy of Nuclear Power Safety is the best answer, I do not know. I taught for five years in a Federal academy (U.S. Air Force Academy), and spent several years in the Defense Department as an overseer of the personnel policies of the academies. I recognize the inherent difficulties in setting up a Federal academy, staffing it, and maintaining high competence. Nevertheless, I certainly agree that the approach taken so far in the United States is one of great reluctance to address the fundamental problems associated with inadequate training of operators. It is difficult to address this type of a situation without demeaning those people who have given dedicated service in operating nuclear power plants. I don't mean to criticize them. I do mean to criticize the industry.

Nuclear technology advanced in size and complexity far more rapidly than most utilities were ready to handle. In the process, both managers and operators have had their limits exceeded. I do believe that higher requirements are necessary to get a level of competence into the control rooms to handle this technology.

This is not a view solely restricted to me. In a 1982 letter to the Nuclear Regulatory Commission, the Vice President for Nuclear Engineering of the American Nuclear Insurers, while disagreeing with the "tendency to substitute academic training for operational experience," suggested, "an arrangement whereby under emergency conditions a relatively senior engineer with considerable operating experience could be quickly brought to the aid of an operational crew."

I believe there is a faulty conclusion both by the peer review panel and the nuclear insurers. They seem to believe that the degreed engineer introduces an inexperienced person into the control room. The point that I have tried to stress is that the degreed person must also get an experience building program. Apprentice training would be required to develop experience with the power plant, but rather than taking a high school graduate, the program would start with a college graduate. The Air Force does not take college graduates and immediately put them in the pilot seat of an aircraft. The college graduate is given extensive flight training before going into an operational unit. If he or she is going into a multi-engine aircraft, that individual goes into the co-pilot's seat. Similarly, what I have constantly proposed is to take the technically trained persons and put them into the operator development program instead of starting with high school graduates.

An excellent summary of the problems and the characteristics that I see as problems in the industry was included in a letter to INPO in 1981 by one of their advisers who wrote, "I do not believe there will be a high level of professionalism and esprit de corps in reactor operations until reactor licensees decide to treat reactor operations as a profession and treat reactor operations personnel as professionals....The prevalent philosophy seems to be that if one hires individuals with intellectual drive and ambition, that they will not spend a lifetime as a reactor operator. Apparently overlooked is the fact that a high degree of professionalism and esprit de corps in operations can by itself cause people to be attracted and to remain in the profession. Quality reactor operations and opportunity for continued learning can continue to provide professional challenges which can lead to the retention of personnel. I believe if operations were approached more professionally, there would be much to keep bright individuals interested in operations."

The writer pointed out that some turnover of operations personnel does have positive aspects because it supplies individuals with plant operations experience for further essential jobs within the utility and the industry.

Mr. Chairman, I thank you for this opportunity to provide a summary of my views. I have long argued for improving the quality of not only operating personnel, but also of the maintenance people and of the management in the nuclear industry. As I have said, it's a dangerous technology, but I believe it can be handled safely. It is not at all obvious to me that the approach taken by the United States nuclear industry is one which will lead to such safe handling.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICE OF THE
COMMISSIONER

October 4, 1979

MEMORANDUM FOR: Executive Director for Operations

FROM: John Ahearne JF Ahearne

SUBJECT: STUDY OF REQUIREMENTS FOR OPERATOR LICENSING

I believe it appropriate for a competent outside organization to provide a thorough assessment of what needs to be done to significantly upgrade our licensing requirements for reactor operators. The NRC can benefit from an independent perspective on what should operators know, how they should be trained, and how they should be examined for competence.

The TMI accident has provided the impetus for a major upgrade in requirements. The recent events at North Anna reinforce the concern about the competence of some operators. In the "Review of License Event Reports," September 20, 1979, the ACRS has also pointed out the importance of operator actions:

> Human errors in the design, operation and maintenance of reactor components and systems represent a significant source of LERs. Up to 50% of all failures appear to be attributable to this source. Contributing factors include the use of inadequate instructions, procedures and/or guides; a lack of adequate attention to man/machine interfaces so as to reduce the probability of error; and the use of improperly trained personnel. The Committee recommends that these and related problems be given increased attention by the NRC.

I believe the following items, at a minimum, should be included in a study of reactor plant operator licensing requirements:

1. Adequacy of current NRC requirements and implementing guidance (including 10 CFR 55, Reg. Guides 1.8, 1.33, 1.114, 1.16).

2. Scope and relevancy of training materials and subject matter: NRC guidelines or approval for lesson plans.

3. NRC practices for implementing and enforcing the training requirements, including the extent of auditing used.

4. Positions which should require NRC licensing (i.e., currently exclude key maintenance positions, auxiliary operators).

5. Use of simulators vs. in-plant training; emphasis currently on simulator training; actual plant vs. simulator response to transients.

6. Overseas practices for qualification of operators.

7. Applicability of some of the U. S. Navy approaches for training and qualification of nuclear plant operators.

8. Prescreening of candidates prior to utilities investment of training time in individuals; the degree of commitment to individuals who have gone through training and the possible reluctance of utilities to lose their investment.

9. Actual vs. expected success rate for candidates as a measure of the difficulty and comprehensiveness of qualification program.

10. Degree of licensee top management involvement in qualification programs; certification by management that a candidate is ready for NRC examination.

11. Amount of training required for management.

12. Method of conducting written examinations: variation in questions, times allowed, acceptable scores.

13. Oral examinations: ability for follow-up, in-depth questioning, unannounced questioning of operators on an audit basis.

14. Practice of qualifying "cold" operators, with no prior reactor operating experience, for initial operations at a new plant. (This can occur at a utility with no other nuclear experience in plant design or operation.)

15. Criteria for Waivers of examinations as allowed under 10 CFR 55.7 and 55.24; extent of waivers and experience of individuals granted waivers; approval authority for waivers.

16. The one-time problem of requalification of all present operators to meet any upgraded requirements (i.e., how would the "backfit" of new requirements be expeditiously implemented).

17. Scope of follow-up, requalification examinations; who should conduct; use of technically expert NRC (NRR, RES) individuals to conduct examinations in specialized areas.

18. Requirements for qualifications and competency of instructors.

19. Prerequisites for advancement from operator to senior operator, e.g., minimum operating experience at a fully operational nuclear power plant.

20. Recording and reporting of operator errors; identification of individuals who make errors; feedback of experience to training programs; criteria for requiring requalification based on operator errors; method of recording on-the-job proficiency and performance.

21. Compensation and status of operators compared to other high technology fields where similar responsibilities are exercised.

22. Reserving reactor time for periodic (unannounced?) casualty drills.

cc: Chairman Hendrie
Commissioner Gilinsky
Commissioner Kennedy
Commissioner Bradford
Secy
GC
PE
NRR
RES

John F. Ahearne

Answers to Questions for the Hearing Record
Nuclear Power Plant Employees' Training
Senate Environment and Public Works Subcommittee
on Nuclear Regulation
Hearing of June 27, 1985

Following are my answers to questions submitted by Senator Moynihan on July 9.

(1) Pilots are highly educated, highly trained, and often paid more than the mid-level managers of commercial airlines. Ought the nuclear industry be similarly structured?

Answer: Yes, definitely. There is a major similarity between commercial airlines and nuclear power plants: a highly complicated technical system is being controlled principally by automatic systems, but occasionally the human operator must take over. This is particularly true in times of emergency. At such time, a job which may have a tendency to become dull and boring suddenly becomes highly demanding, requiring quick reaction and a thorough understanding of what is happening with the system, an understanding which oft times must integrate information from a variety of confusing signals. At risk are possibly lives and certainly significant hazard to equipment. Several airline crashes can cause an airline company to be forced to stop operation and to go out of business. A major nuclear power plant accident can put a company close to if not over the edge of bankruptcy. Consequently, the type of people needed to perform the operation of the system must be ones for whom the companies should be expected to place high requirements and pay at a level higher than that earned by many mid-level managers.

(2) What specific steps do you recommend the industry take to increase the professionalism of its operations personnel?

Answer: I believe the easiest and most direct step would be to require a bachelor's degree in engineering for power plant operators. This would be an automatic discriminant, which would bring in more competent individuals, ones who have the basics which would enable them to understand a nuclear power plant's operation. I would prefer to have this degree in nuclear engineering; additional engineering courses should be required for engineers of other disciplines. This requirement would not take the place of the training program geared to understanding the specifics of operation of the particular plant. The engineering degree would merely be a new entry level requirement. In order to compete for these individuals, utilities would also obviously have to raise entry salaries.

(3) What recommendations would you make concerning the technical expertise and professionalism of utility managers?

Answer: As I have mentioned in writing and previous testimony, I believe that utility management has a weakness similar to that of the operators. With few exceptions utility managers do not understand the technical operation of nuclear power plants. Obviously all technical people do not make good managers. And I do not believe that to be a good manager, you must be a technical person. However, I do believe that management of a nuclear power plant and of nuclear power operations does require technical training. Therefore, I believe utilities must screen out those individuals, however brilliant, whose training is in law, business economics, etc., and look for and develop the competent management people who have technical training. I note with substantial interest that in both the cases of Seabrook and recently Davis-Besse, when the utility was in trouble they turned to technically qualified individuals to take over problem operations.

(4) Should reactor operators have engineering degrees?

Answer: Yes, as I explained in my answer to Question 2.

(5) Should the Nuclear Regulatory Commission (NRC) require the examination and licensing of plant personnel other than candidates for operator and senior operators licenses?

Answer: This is a more difficult question, on which I have spent less time. I believe it important that standards be established for maintenance personnel. I am uneasy about requiring the NRC to develop examinations and licensing, because I do not believe the NRC has devoted much thought to these subjects. A higher standard of performance must be required of maintenance personnel in many power plants. I would expect that this would come from having more competent technical people in plant management positions. Several years ago I visited the Shipping port plant and the Beaver Valley plant, side by side plants. While recognizing that the Shipping port plant was much smaller (about a factor of ten) than the Beaver Valley plant, one could not help but be struck by the night and day difference in the quality of the plant. The Shipping port plant was spotless, as is often true of the boiler rooms on a well-run Navy ship. The Beaver Valley plant had the chaotic disarray and messiness that is unfortunately associated with a sloppy operation.

(7) Do you advocate establishment of a civilian equivalent of the nuclear Navy's "engineering officer of the watch"--a graduate engineer with special undergraduate and graduate training in nuclear-related fields.

Answer: Under the stimulus of several pointed remarks by Admiral Rickover, several years ago I looked into the question of having an engineering officer of the watch. (I do not mean to imply that the admiral was recommending the NRC require such, only that he suggested there were several attributes of the Navy operation that would be helpful for me to understand.) The context of an engineering officer of the watch, where a single person monitors or controls the activities of several other persons and has the authority to shut down the plant at a given moment, has several features that are desirable and several features that do not transfer to commercial operation. The desirable features are the competent individual in overall control who monitors the performance of the plant and on his own (or her own) can take action to shut down the plant. That is a desirable feature. The parts that don't transfer really have to do with the fact that the nuclear Navy's power plant is much simpler than a commercial power plant. The excursions for the Navy system, numbers of controls, and operating regime are so much simpler that they can be controlled by a lesser qualified individual. There also are far fewer control systems to monitor. Consequently, it is entirely feasible to have a single engineering officer of the watch in whom most of the competence resides. In a nuclear power plant that cannot be the case. The several operators themselves must have a much higher degree of competence than the individual enlisted operators in the Navy nuclear power plant program.

(8) You distinguish between technical training (knowing how to work the machines) and technical understanding (knowing how the machines work). Do you believe that the nuclear industry and the NRC place sufficient emphasis on the latter?

Answer: I definitely do not believe that the nuclear industry places enough emphasis on technical understanding--in fact, with rare exception, they place none. There was a significant step-function increase in NRC emphasis on understanding as a result of the Three Mile Island reviews. Although I have not been following in detail the NRC's efforts over the last two years, my impression is they have not pushed particularly hard on this since then.

(9) Is reactor theory as important as operating procedure?

Answer: They are both equally important. I would not want a nuclear power plant operator to only know theory and to not know operating procedure, in other words, not know anything about the particular plant that the operator is attempting to control. On the other hand, we have had too many examples of cases where a lack of understanding of reactor theory has led operators to make mistakes during emergencies or close-to-emergency situations. Three Mile Island is the most obvious case.

(10) Should there be a uniform national curriculum for theory?

Answer: I don't believe that is necessary. The theory taught in a good engineering department is quite adequate.

(11) If so, who should devise it and who should teach it?

Answer: As I mentioned in my answer to Question 10, I don't think there is necessity to have a uniform national curriculum. The faculty of any good nuclear engineering department is quite capable of teaching the necessary nuclear theory.

(12) You were chairman of the Commission when the Institute of Nuclear Power Operations (INPO) was created. Does INPO have sufficient power to do what it proposes to do?

Answer: I'm not sure what it is that INPO proposes to do. Consequently, I cannot really answer whether they have enough power.

(13) At the time it was created, linking utility borrowing to insurance rates to INPO was considered. Is this a good idea?

Answer: An extremely good idea. My recollection is that it was more than considered. I believe the NRC Commissioners were told the nuclear utility insurance coverage would be linked to INPO approval. If INPO did not approve a plan, the nuclear insurance would not be available. I thought this was an outstanding idea. It would give INPO real teeth. (Whether INPO would ever use those teeth is an entirely different question. I am getting an increasing suspicion that INPO will not.)

(14) Does INPO have sufficient power?

Answer: I do not believe so. Their power appears to be one of persuasion and that is not adequate. Some type of link, for example, to insurance coverage, would substantially increase INPO's power.

(15) What would happen if INPO were to make public information that it uncovers about deficiencies in individual training programs?

Answer: I can see several possibilities. First, INPO might have an increasingly difficult time getting access to utility information. I expect that NRC and other pressure on responsible utility companies might be able to get those utilities to force their less cooperative colleagues to continue to allow INPO access. More importantly, I think that INPO publicly criticizing some plants would begin to restore what I see as INPO's eroding credibility.

(16) How else could the current scheme be improved?

Answer: I am not certain to what "current scheme" refers. If it refers to INPO's operating procedure, I believe there are two areas in which INPO is being perceived as having problems. First, their unwillingness to release reports immediately upon their completion or soon thereafter. Second, their apparent inability to find any plant that is significantly weak.

The NRC has had similar problems. The NRC, however, has its own set of almost irresponsible masters, namely, the Congress, who are all too subject to press attention. The NRC seems to be incapable of saying that a plant is bad but still acceptable for operation, or, a plant is now unacceptable and must be shut down, unless there are very specific violations. I think the Toledo-Edison, Davis-Besse is a classic case. That plant has a history of poor management, but apparently never reaching the level at which the NRC believes it can make a case stand up to close down the plant. I think it would have been worth trying.

Similarly, INPO appears unable to say that a certain plant just doesn't meet the standards for good operating practice. INPO has made a motto of standards of excellence--stressing the concept that whereas the NRC only establishes what procedures are adequate, INPO establishes what are necessary for excellence. But there has never been a plant that has failed to meet these standards. This is not believable.

Thus, two ways to improve INPO's current practice would be (1) release reports to the public a fixed period after giving them to the utility (perhaps 30 days); (2) put a plant on notice that it failed. Two failures would cause INPO to remove approval.

TESTIMONY OF
MITCHELL ROGOVIN

ROGOVIN, HUGE & LENZNER
WASHINGTON, D.C.

BEFORE THE

SENATE SUBCOMMITTEE ON NUCLEAR
REGULATION, SENATE COMMITTEE ON ENVIRONMENT
AND PUBLIC WORKS

June 27, 1984

Mr. Chairman, members of the Senate Subcommittee on Nuclear Regulation at the outset, I want to commend your subcommittee for scheduling hearings such as these. We need an annual public audit of the progress of the NRC and the industry it regulates and we need it so the public has the opportunity to determine whether the lessons learned at Three Mile Island are being implemented. These hearings are a step in this direction.

You have invited me to testify on the National Nuclear Powerplant Personnel Training Act of 1985, (S. 16). I became familiar with the issue of training for nuclear powerplant operators during the aftermath of the accident at Three Mile Island on March 28, 1979. At that time, I was asked by the Nuclear Regulatory Commission (NRC) to direct a Special Inquiry into the causes of the accident at Three Mile Island (TMI). My task was to make the fullest possible inquiry into the immediate causes of the accident and also to identify underlying deficiencies in reactor safety at TMI and elsewhere.

The results of that inquiry indicated that the most serious problems relating to TMI were not technological. In other words, nuclear power can be an acceptably safe source of energy. The fundamental problems, rather, were managerial. Both the NRC and the industry had failed to provide the sound leadership and effective management necessary to meet the national need for safe commercial generation of nuclear power.

S. 16 seeks to remedy this failure insofar as it has affected the selection and training of nuclear plant operators. For all the attractiveness of the proposed legislation, I believe a better solution lies in a selection and training partnership between the public and private sector, a partnership cemented by economic incentives rather than coercive governmental regulation. Before discussing the proposed National Academy for Nuclear Power Safety, however, it would be helpful to review the job of nuclear plant operators and the selection and training procedures used at the time of TMI and since.

The Nuclear Plant Operator

The position of a nuclear plant operator has been properly likened to that of a commercial airline pilot. Both jobs require the manipulation and control of extremely complicated machinery. Both jobs can be mundane, even boring, when the machinery is operating properly because the actual machinery used is highly automated, run by computers most of the time. Further, both fields draw heavily for personnel on people trained by the armed services. Most importantly, both jobs carry direct responsibility for human lives and the potential for disasterous results of the operator or pilot does not react quickly and intelligently and immediately when a malfunction occurs.

But, the two positions are very different in many significant ways. The chief difference is directly related to the issue before this subcommittee: commercial airline pilots are very carefully selected; they are trained on the basis of uniform standards; and they are provided with feedback on their weak points and are required to master their shortcomings before licensing. Further, pilots are given regular rigorous physical and mental exams. And they are paid very well.

On the other hand, reactor operators are not selected on the basis of any particular procedure or in accordance with any particular standards, they must simply have experience working in a power plant. They are trained in a variety of programs of varying quality. For licensing they need only receive an overall passing grade on NRC examinations; and they can receive licenses even if they fail one or more categories on the exam. Finally, their salaries suggest that the industry considers them to be technicians, not professionals.

Thus we face a situation in which the people in charge of a complex and potentially a frightfully dangerous technology are to often carelessly selected, undertrained, and underpaid. As the TMI incident indicates the inability of these operators to diagnose and correct problems properly can turn a simple breakdown into a disastrous meltdown.

What We Learned While Investigating Three Mile Island

In the TMI investigation, we found that the NRC, the utilities, and the vendors had focused their attention on design and construction; they had not paid sufficient attention to the actual operation of the reactors after they built. The responsibility for the safe operation of the reactors was fragmented among these groups and often further fragmented within each of the relevant groups. And the selection and training of operators was decidedly a low priority item in the underemphasized operations field.

A. Selection

Our study found that the only requirements for selection as a TMI reactor operator are a high school diploma or equivalent and two years "experience."[*/] Experience can consist of almost any job in a power plant and a senior reactor operator must have four years of such experience. Most operators gain the requisite experience by working as technicians or unlicensed auxiliary operators or by working in the Navy nuclear program.

There are no requirements that civilian operators have problem solving or spatial orientation capabilities, both of which are important qualities for an operator. There is no required psychiatric examination, nor any required review of a potential operator's Navy records.

B. Training

The laxity with which operators are selected becomes all the more worrisome when one considers the lack of adequate training for reactor operators. Even the instructors who train operators often lack college training in a relevant field.

As part of the TMI investigation, we asked the Essex Corporation to examine the training provided for TMI's operators. Essex concluded that "operators were exposed to training material but

---

[*/] These are the American Nuclear Society standards, which have been endorsed by the NRC. The NRC itself has not promulgated regulations bearing on selection.

they certainly were not trained." Training was not directed at the skills and knowledge needed to satisfy job requirements. Only 6% of training time was spent using reactor simulators, and this time was used to demonstrate simple procedures, instead of testing and developing the operators' diagnostic skills. The training process did not measure the capabilities of the operators; it took an archaic approach to learning; it bore little relation to actual plant procedures; and it used materials and methods which were not formally and regularly updated or improved. In short, the training process failed to prepare the operators to perform their jobs effectively: the program focused on _procedures_, and did not provide or enhance the _skills_ necessary to respond to foreseeable accidents or diagnose new problems.

C. Examination and Licensing of Operators

Given the Essex Corporation's conclusions about the inadequacy of training for TMI's operators, it came as a surprise to find that these TMI operators scored higher than the industry average on NRC licensing examinations. Unfortunately, this licensing examination also fails to test the skills a capable operator must possess. Essex identified fifty-three skills or tasks, many of them diagnostic, which would have enabled TMI operators to respond properly during the various periods of the accident. They found that only one or two of these fifty-three skills were covered on any individual NRC licensing test.

Operators must receive an overall score of 70% to pass the NRC written exam. Unlike a pilot who must receive additional training if he does not perform well on certain sections of the FAA licensing examination, can win a license even if he fails a section of the examination. In fact one of the senior TMI operators had failed the examination section covering "general operating characteristics" of TMI; others had failed different sections. They were not provided with feedback following the examination, nor were they required to improve in the areas where they performed poorly. This defect was significant because several of the examination questions the TMI applicants failed related directly to the events of March 28, 1979!

D. Shift Manpower

At the time of the TMI accident, the NRC required that an operator or senior operator be at the controls at all times, and that each shift consist of two operators and a senior operator. Thus, given the inadequacies in selection, training, and licensing, at any given time there might be no one available with any college or advanced training in engineering or nuclear reactors. By contrast the Navy requires that an engineering officer of the watch -- a graduate engineer with special undergraduate and graduate training in nuclear-related fields -- be present and in command at all times.

Following Three Mile Island, the NRC increased manpower requirements to include another senior operator and a technical advisor (with an engineering degree or its equivalent). The

Commission is now considering combining these two new positions, so that there will always be one person with advanced technical knowledge, in the direct chain of command.

NRC and Industry Reaction to Three Mile Island

Three Mile Island and the investigations that followed succeeded in stimulating a fresh and hard look at actual nuclear plant training and operations. Besides the increased NRC manpower requirements, the utilities themselves have taken steps to improve training.

The resources available for training at individual reactor sites have increased several-fold. Many plants now have simulators and are able to provide training using data fed directly from the plant control room. Almost all plants have changed from four to five or six shifts of workers to facilitate ongoing training.

These and other changes are being guided by the Institute for Nuclear Power Operations (INPO), an industry group which assists utilities in improving their training programs and accredits programs that meet INPO standards. INPO has also started an international information network to analyze plant operations and inform utilities of significant developments throughout the work. The industry representatives here today will explain these efforts, so I will not discuss them in detail. I hope that INPO will eventually undertake to accredit all utilities and that accredited programs will provide thorough training, and in so doing remedy the problems we found in the TMI investigation.

There are several advantages to an industry-run program such as INPO. By sharing information and setting a high industry standard, I hope that INPO can boost the training programs of all utilities to a level that only a few have yet reached. Moreover, INPO is a cooperative, industry-run program, rather than a coercive regulatory scheme. As such it is not an adversary of the utilities; since the group shares a common interest with the utilities, the utilities may be more cooperative in providing the information necessary to make the program work. As you are aware, the NRC has decided to delay any new rulemaking in the area of training for two years in order to evaluate the results of INPO's accreditation program.

Admittedly, an industry program like INPO has certain limitations. For instance, INPO has no enforcement powers, other than the threat of triggering future government action. Secondly, utilities are under no financial pressure to participate. In our report, we suggested that INPO accreditation be linked to the insurance premiums charged in connection with an industry coinsurance scheme in order to provide an economic inducement to participation in INPO. Even without a co-insurance program, one would think that private insurance carriers would, out of self-interest, link reduced premiums to higher quality training.

Finally, INPO's accreditation program only applies to training procedures. It has little effect on the subjects taught; it simply ensures that adequate time, instructors, facilities, and lesson plans are available for training. Thus, it may not produce the sort of uniform high-quality training that should be available and required. And the accreditation program is still operating under a principal troublesome assumption concerning the people who operator nuclear power plants: namely, that operators are only technicians, that they are trained to carry out specific and limited functions, and that virtually anyone can become an operator.

The National Academy Proposal

S. 16 may be the solution to the training problem, but I would much prefer to see INPO do the job, abetted by a rigorous NRC enforcement program.

I foresee significant problems if we entrust the NRC and its proposed academy with both responsibility for training and enforcement. This confluence of responsibility creates a potential conflict of interest within the NRC, a conflict, moreover, that would pose a disincentive to safety.

I believe it incumbent upon the NRC to set standards for the duration and training of candidates for licensing operators and other positions by nuclear reactors. Furthermore, the NRC should insure that a rigorous licensing examination is given.

In taking on this responsibility, the NRC should work with INPO to set a national curriculum. In so doing, the NRC will be able to influence the level of education and training without undertaking the actual training; and it will not be placed in the potentially compromising position of both running the training program and testing the quality of its product, i.e., the graduate operators.

A federal academy may seem to be an attractive proposal. But, I am concerned that if such an institution trains operators, the institution rather than the utilities would become the focal point for safety. Given the past failures of the NRC to provide adequate leadership on safety issues, I doubt that this would be a good result. The best solution to this problem is to broaden INPO's training responsibilities and let the NRC set training standards.

Conclusion

A couple of years after Three Mile Island, I pointed out in a piece in the New Yorker that the pressures to implement the recommendations of the Kemeny Commission and our own inquiry had dissipated largely because the American public had a short attention span which was captured along with the hostages in Teheran. Since then, we have seen another accident at the Davis Besse plant, an incident likewise forgotten as American hostages were taken in Beirut. Through it all, however, we still remain hostages to substandard training in nuclear plants throughout the country.

LAW OFFICES
ROGOVIN, HUGE & LENZNER
A PROFESSIONAL CORPORATION
1730 RHODE ISLAND AVENUE, N W
WASHINGTON, D C 20036

MITCHELL ROGOVIN
HARRY HUGE
TERRY F LENZNER
JONATHAN D SCHILLER
DAVID R BOYD
RONNA LEE BECK
EUGENE J COMEY
VICKI C JACKSON
MARSHALL S WOLFF
SUSAN L CARNEY
RANDALL L SPECK
KRISTA M FOGLEMAN
SAUL B GOODMAN
MICHAEL D LOWE
GARY K HARRIS
JEFFREY H BLATTNER
JAMES E PFANDER
DAVID GERONEMUS
STEVEN K HOFFMAN

JAMES F NEAL
OF COUNSEL

TELEPHONE
(202) 466-6464

TELECOPIER
(202) 466-6420

June 4, 1985

The Honorable Daniel Moynihan
United States Senator from New York
United States Senate
Washington, D. C. 20510

Dear Senator Moynihan:

This letter is in response to your May 6th letter requesting my comments upon the National Nuclear Power Plant Personnel Training Act of 1985 (S. 16) introduced by you earlier this year.

Shortly after the Accident at Three Mile Island the Nuclear Regulatory Commission retained me and my law firm to conduct a Special Inquiry to determine what happened and why, to assess the actions of utility and NRC personnel before and during the accident, and to indentify deficiencies in the system and areas where further investigation might be warranted.

Having stated my experience and potential bias, I believe your legislative proposal goes a long way toward correcting one of the serious shortcomings we found, i.e., the need for improved operator training. Such training however is part of a broader need to strengthen the technical and management capability of the utility.

While many have singled out "operator error" as the reason for the Three Mile accident, this is an incomplete analysis. Our report found "inadequate training, poor operator procedures, a lack of diagnostic skills on the part of the entire site management group, misleading instrumentation, plant deficiencies and poor control room design." A number of these significant factors are not within the control of the operators, but should nonetheless be within the scope of S. 16 and the overall capability of a utility run nuclear reactor.

ROGOVIN, HUGE & LENZNER
A PROFESSIONAL CORPORATION

The Honorable Daniel Moynihan
June 4, 1985
Page Two

Significantly, we discovered that the very accident that occurred at TMI had occurred before in Toledo, Ohio and Beznau, Switzerland. Nonetheless, the operators at TMI never learned of how the same failed-open pressurizer relief valve (PORV), and the same misleading indications to operators that the reactor coolant system was full of water had been promptly diagnosed and solved in a matter of minutes in Ohio and in Switzerland. This clearinghouse activity is a vital part of the operator's continuing education.

Fragmented bureaucracy at the NRC and inadequate training by the utilities often put high school graduates into the control rooms of nuclear reactors without technically competent on site supervisors. Your proposed Academy should have the potential of remedying this enormous shortcoming.

In sum, the Academy is an excellent proposal; one that is long in coming and to be supported. If I can be of further assistance in the future, please let me know.

Sincerely,

Mitchell Rogovin
Mitchell Rogovin

LAW OFFICES
ROGOVIN, HUGE & LENZNER
A PROFESSIONAL CORPORATION
1730 RHODE ISLAND AVENUE, N. W.
WASHINGTON, D. C. 20036

MITCHELL ROGOVIN
HARRY HUGE
TERRY F. LENZNER
JONATHAN D. SCHILLER
DAVID R. BOYD
RONNA LEE BECK
EUGENE J. COMEY
VICKI C. JACKSON
MARSHALL S. WOLFF
SUSAN L. CARNEY
RANDALL L. SPECK
KRISTA M. FOGLEMAN
SAUL B. GOODMAN
MICHAEL D. LOWE
GARY K. HARRIS
JEFFREY H. BLATTNER
JAMES E. PFANDER
DAVID GERONEMUS
STEVEN K. HOFFMAN

JAMES F. NEAL
OF COUNSEL
—
TELEPHONE
(202) 466-6464
—
TELECOPIER
(202) 466-6420

August 15, 1985

The Honorable Daniel Patrick Moynihan
United States Senate
Washington, D. C.

Dear Senator Moynihan:

I was pleased to be able to testify at the June 27 hearing of the Senate Environment and Public Works Committee, Subcommittee on Nuclear Regulation and appreciated your kind letter of July 9th.

Enclosed are my responses to your questions for the record.

Sincerely,

Mitch Rogo

Mitchell Rogovin

Enclosure

Questions for the record from Senator Moynihan

REPLY OF MITCHELL ROGOVIN

QUESTION #1:

> You and I both have drawn an analogy between reactor operators and airline pilots. For the most part, both jobs are routine. But in unusual, perhaps unprecedented situations, the reactor operator and the pilot must act quickly and properly. As you point out, pilots -- unlike reactor operators -- are "very carefully selected," and "trained on the basis of uniform standards." They are given "regular rigorous physical and mental exams," and "are paid very well." Ought the nuclear industry be similarly structured? What specific steps do you recommend the industry take to increase the professionalism of its operations personnel? What recommendations would you make concerning the technical expertise and professionalism of utility management?

I believe the nuclear industry could improve both the quality of its plant operators and its overall technical competence if it were to structure the operators' jobs with a view toward the creation of a professional ladder within the company. Promotion from such line operating positions into senior operators and the technical and management staffs should be part of the career path set forth at the time of initial recruitment in an effort to change the "workplace sociology" of the nuclear industry.

Currently I sense that some of the utilities are reluctant to seek out plant operators with engineering or advanced degrees because of the economics of such hiring practices and even more out of fear that such a shift would send salary ripples throughout the utility. Such examples of shortsightedness are not infrequent in this industry.

The nuclear industry is now entering a mature phase. Few plants are being built, nearly eighty are in operation. The industry as a whole can turn more of its technological expertise toward issues of safe, efficient plant operation. And operations must be integrated with other corporate functions.

This is an area in which federal intervention would be difficult, and probably inappropriate. The utilities must, of course, be allowed to run their own corporations. And the utilities must remain responsible for operations, and all other aspects of plant safety. To the utilities, I would say that while my suggestion may not appear significant in terms of narrow job definitions or skills required for different tasks, it makes very good sense in terms of "workplace sociology." And it makes very good sense in terms of the overall technical competence of the industry, an industry which will be operating nuclear powerplants for at least the next forty years.

QUESTION #2:

> You discuss a "selection and training partnership" between the public and private sectors "cemented by economic incentives rather than coercive governmental regulation." Please elaborate. What enforcement powers would you grant the Institute for Nuclear Operations (INPO)? Ought INPO have such authority?

As an initial matter, let me repeat that it is extremely important that we provide the different institutions and actors involved in the nuclear industry with clear-cut roles, roles they are well-suited to perform. The Institute For Nuclear Power Operations (INPO) should not be an enforcement body. As an industry-run program, its primary role should be to help utilities upgrade their training programs, and to disseminate information on industry-wide operating experience.

On the other hand, INPO's accreditation review involves the participation of outsiders, independent experts who lend the process objectivity, and provides confidence in the idea of an industry-run accreditation program. INPO accreditation could be linked to various sanctions and incentives, but INPO should not enforce those. For example, others, such as the insurance industry, should look to INPO accreditation as a significant requirement in obtaining coverage.

The Nuclear Regulatory Commission is the most obvious institution to enforce training standards, and the NRC may eventually take action against utilities that do not upgrade their training programs. In the meantime, I would continue to support an INPO-run training program.

I believe that with the industry under strong financial pressure, there are ample economic incentives which could be applied to encourage improved training, and INPO accreditation.

As was pointed out, INPO was originally to have been linked with industry insurance. Plants that received poor ratings would be unable to get insurance. This proposal was abandoned, but I believe it could be revived. We know that human error, whether plant maintenance, or operator reaction to a malfunction, is an extremely important factor in most accidents; it was at Three Mile Island. An insurance structure that does not take into account the quality of training provides a disincentive to safety.

Another powerful economic incentive which should be fully developed exists in the rate-setting proceedings of the Public Utility Commissions (PUCs). As today the PUCs are not allowing utilities to recover their excessive construction costs from ratepayers, so in the future they should not allow utilities to recover additional costs that result from poor or inadequate training. If human error causes a shutdown at a plant which has not been accredited by INPO, or if the shutdown can be traced to a non-accredited program, the P.U.C. should refuse to allow the utility to recover cost of replacement energy. This solution has the advantage that it can (and will) be implemented without any action on the part of the industry or the federal government. It has the disadvantage of being ad hoc, and only taking effect after a shutdown or accident has occurred. Tying insurance to INPO accreditation, on the other hand, would facilitate immediate improvement by those utilities which do not provide adequate training.

I would be very interested to hear industry reaction to enforcement mechanisms such as these, which simply attempt to place the costs of inadequate programs with those responsible for the inadequacy. I would also very much like to hear ideas for other similar incentives.

QUESTION #3:

> Do you advocate establishment of the civilian equivalent of the nuclear Navy's "engineering officer of the watch"? What else ought we try?

In the report of the NRC's Special Inquiry Group on Three Mile Island, we recommended that a qualified engineer be available, in the chain of command, on every reactor shift. I continue to strongly favor such a requirement, a civilian equivalent to the Navy's "engineering officer of the watch."

It is essential that at least one person in the control room have not only detailed technical knowledge, but an understanding of the underlying principles behind the nuclear plant's operation and the ability to diagnose new problems as they arise. We found that not only the operators at Three Mile Island lacked these skills, but that the supervisory and management personnel in the control room on the first day of the accident lacked the familiarity with the plant necessary if they were to contribute very much. We were in a situation where no one on-site knew both the plant itself and the physics and engineering behind it. The civilian "engineering officer of the watch" would have such knowledge.

The NRC has increased manning requirements for a reactor shift since Three Mile Island, and now demands increased technical background from a Senior Operator who acts as technical advisor to the shift. And it is my understanding that requirements will be changed again so that increased background and education will be demanded of someone in the direct chain of command. These developments are welcome, and begin the task of upgrading the job classification and professional status of those in the control room. But these incremental changes do not go far enough, and will not bring about the transformation I believe is necessary in the way nuclear power reactors are operated in this country.

TESTIMONY OF THOMAS PIGFORD
BEFORE THE SUBCOMMITTEE ON NUCLEAR REGULATION
OF THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
U. S. SENATE
June 27, 1985

Re: National Nuclear Power Plant Personnel Training Act

Good morning, my name is Thomas Pigford. I am a professor of nuclear engineering at the University of California at Berkeley.

I was a member of the President's Commission on the Accident at Three Mile Island, the Kemeny Commission. That commission, established immediately after the Three Mile Island accident, conducted a rigorous study and investigation of the event and made comprehensive recommendations.

It is from that background, as well as from observations as chairman of the Advisory Council for the Institute of Nuclear Power Operations (INPO), that I comment on the proposal to establish a National Academy for Nuclear Power Safety that would provide standardized and comprehensive training of people who operate the Nation's civilian nuclear power plants.

I applaud the theme of the proposed legislation which emphasizes the importance and need for proper and quality training of nuclear plant personnel, and I especially endorse the goal of comprehensive training of people at all levels. It is vital that training and retraining be carried out at all levels as a continuing management responsibility.

As you know, there have been many successes in the nuclear industry and there have been many problems, including problems of construction, delays, and safety. It is apparent that the successes resulted from strong and careful management of the nuclear plant and of the utility; most of the problems were those of management -- the "people problems," "attitudes," etc., spoken of so strongly by the Kemeny Commission.

The Commission's report, delivered in October 1979, cautioned that:

> "The legal responsibility for training operators and supervisors for safe operation of nuclear power plants rests with the utility."

We were saying that it is the utility that is responsible for safety, and that responsibility should not be diluted.

We were concerned by the many government actions that could be construed, however incorrectly, as relieving the utility of safety responsibility. For example:

> "The ... vast body of regulations by the NRC tend to focus industry attention mainly on the meeting of regulations rather than on a systematic concern for safety."

In like sense, a federal training center, for which the utility is not responsible for standards and performance, and with no direct interaction with the special training problems of each plant, could encourage a utility to focus attention away from its responsibility for training. It could dilute the central safety responsibility of nuclear plant management, a problem of considerable concern to the Kemeny Commission.

In the Kemeny Commission report we state:

> "We therefore recommend ... the development of higher standards of organization and management that a company must meet to operate a nuclear power plant."

A key ingredient of these higher standards of management is training, training at all levels, training by management, and training of management. Indeed, as an aid to achieve these necessary standards of excellence, the Kemeny Commission report stated:

> "The Commission recommends the establishment of agency accredited training institutions for operators and immediate supervisors of operators."

The Commission envisioned some number of training institutions, where new operators and supervisors are screened and have their first nuclear-plant training. Several such centers were expected because much of even the beginning, institutional-type training is plant specific. A plant's particular design features and operating experiences, many of which change with time, must be fed back and integrated into the training program. Likewise, the plant needs to integrate this classroom-type training into its own more comprehensive and continuing training and retraining. In fact, the utilities have developed and are operating just such centers today.

For example, the Kemeny Commission recognized the greater need for the use of simulators in training and recognized that such simulators must be specific to the particular plant for which the people are trained. Further, we realized that no simulator represents every aspect of the plant, and therefore each simulator will be modified and updated many times during the life of the plant to reflect changes, new information, and operating experience. These are among the many reasons why even formalized institutional training needs to be plant specific and closely allied with plant management.

In the Kemeny Commission's recommendations for agency-accredited training institutions, we were seeking the strong oversight of an independent group or organization that could take an objective critical look at all phases of the training program, including training by institutions and training by management. We were seeking an oversight that could develop high standards and monitor industry progress to these standards.

INPO has proven to be a remarkably effective vehicle for this oversight. It has proven that it can instill high standards of training, operation, and management. It has earned the admiration and respect of the nuclear industry. It has also earned the respect of experts in other fields, especially the representatives from the aircraft industry who serve on INPO's Advisory Council.

The Advisory Council is made up of non-utility experts in fields that relate to some aspect of INPO's work -- science, aviation, human factors engineering, and education, to name a few.

Our job on the Advisory Council is to provide outside review, advice and council on INPO programs and activities. Consequently, we are well informed on the activities and progress of the nuclear utility industry.

We on the Advisory Council have worked closely with INPO and have provided advice on the development and continuing refinement of the INPO technical programs, including the training and accreditation programs.

In conclusion, placing responsibility for all phases of training directly on the nuclear plant management, where it belongs, and continuing INPO as the standard setter and watchdog to accredit training programs and monitor the effectiveness of all levels of training, is the most effective means for the nuclear power industry and the Nation to achieve safe and reliable nuclear power.

UNIVERSITY OF CALIFORNIA, BERKELEY

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO   SANTA BARBARA • SANTA CRUZ

COLLEGE OF ENGINEERING
DEPARTMENT OF NUCLEAR ENGINEERING

BERKELEY, CALIFORNIA 94720

September 5, 1985

The Honorable Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

The attached comments are in reply to your questions as follow up to the June 27 hearing on training held by the Senate Environment and Public Works Subcommittee. I hope that these comments will be useful. Please let me know if there is anything further that I can contribute.

Sincerely yours,

Thomas H. Pigford
Professor

THP/smt

Attachment

September 5, 1985

Answers to Follow-Up Questions on Training for the Nuclear Power Industry

Q: The Kemeny Commission concluded that "The ... vast body of regulations by the NRC tend to focus industry attention mainly on the meeting of regulations rather on a systematic concern for safety." Is this true today?

A: Yes, although both NRC and the nuclear industry have recognized the problem and have made sincere efforts to overcome it. It is apparently difficult for the NRC to make any significant reduction in the number of regulations, but there is evidence that NRC now gives more emphasis to management and safety competence within each licensee's organization and to the need for more systematic safety review within that organization. Similarly, the nuclear utility companies have recognized the need for exercising their own independent responsibility for safety and safety assessment. This is evident through the creation of INPO, the participation in the many issue-oriented INPO workshops, and the thorough INPO audits and utility response on many issues that go beyond meeting the NRC regulations.

However, in my opinion, a disproportionate amount of industry effort is still devoted to the mechanics of meeting NRC regulations. Undoubtedly this results, in large part, from the large number of regulations to be met and the necessity to obtain regulatory approvals without financially crippling delays. This is realistic and unlikely to change, but it does seriously inhibit initiatives in improvements, innovations, and modifications in design and operation that would normally evolve in a less-regulated industry. And, regardless of the serious intent to have the utilities exercise their own systematic concern for safety, the massive effort required to comply with the vast body of requirements and to demonstrate compliance therewith is certain to foster some continued complacent feeling that all of that work in meeting regulations must somehow insure safety.

Q: You cite the need for "training at all levels, training by management, and training of management." Is the industry's "performance based, systems approach" to training sufficient for operations personnel?

A: I believe that the industry's new approach to training the nuclear reactor operators, as documented in INPO guidelines and discussed in INPO workshops, is likely to be sufficient, provided that it includes sufficient follow-up and surveillance to insure that training is a continuing process. There is also increased awareness within the utility industry of the need for performance-based training at all levels of operation and management. However, I have not had the opportunity yet to witness enough of these other training programs and results therefrom to judge their sufficiency.

Q: Dr. Ahearne makes the nice distinction between technical training (knowing how to work the machines) and technical understanding (knowing how the machines work). Should the industry and the Nuclear Regulatory pay more attention to technical understanding?

A: Definitely yes!

Q: And what training do you advocate for utility management?

A: It is easy for any organization to specify the particular subject awareness and knowledge required for each person in the organization to perform his functional requirements, and that should be done with nuclear safety in mind. For example, the chief executive officer will need to know enough about the nuclear system to interpret and act on information and recommendations from his staff, and he must be able to translate that understanding to his directors, stockholders, regulatory agencies, and financial institutions. We learned vividly from Three Mile Island that some individual, chosen to speak for the operating organization, must be prepared to interpret status information in emergencies and explain it to the news media and concerned public.

Focusing on these particular needs readily identifies specific subjects for training, but that is not sufficient. In my view, it essential that each individual in operations and management recognize that he has a continuing responsibility to train his staff and a continuing responsibility to verify that training and awareness remain up-to-date and effective. The mechanisms of training at each level are far less important than recognizing that each supervisor is himself individually responsible to insure that the training is in place and effective. The process becomes really effective when the operating organization recognizes and places high priority on safety and safety training as a management responsibility, and when reporting on the status and adequacy of safety and safety training is as important as reporting on productivity and cost. Some organizations, such as E. I. du Pont de Nemours, adopt particular performance indicators, such as lost time injuries, as a means of probing into the state of safety awareness and training adequacy. Specific incidents are evaluated, not only to identify technical fixes to avoid further lost-time accidents, but also to probe into root causes that may illuminate inadequacies in understanding and training. This is the most effective training process that I have witnessed, and it is effective at all levels of operation and management.

Q: Are you satisfied that the Institute for Nuclear Power Operations (INPO) has sufficient enforcement capabilities to deal with utilities least willing or able to upgrade their training programs?

A: Dr. Pate and others have informed you how INPO evaluations can influence the availability of insurance. This is important, but from my observations the greatest influence of INPO evaluations is the exercise of peer pressure by the large number of utilities that have committed themselves to INPO. INPO has developed an effective technique of working with top management of each utility to remedy problems and to improve performance, and it has established its credibility in establishing safety goals that are demonstrably achievable by good safety management and that require significant improvements by some operating companies. Thorough review and follow-up by INPO and its Board, careful and open discussion of good and poor practices in INPO workshops, and the many other techniques of peer review and pressure appear to me to be far more effective than any of the other means of enforcement that are suggested.

Respectfully submitted,

Thomas H. Pigford
September 2, 1985

June 27, 1985

SHERWOOD H. SMITH, JR.
NATIONAL NUCLEAR POWER PLANT PERSONNEL TRAINING ACT (S.16)
SUBCOMMITTEE ON NUCLEAR REGULATION
COMMITTEE ON THE ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

I am Sherwood H. Smith, Jr., President and Chairman of Carolina Power & Light Company. I also serve as Chairman of the Edison Electric Institute and as a member of the Board of Directors and Executive Committee of the American Nuclear Energy Council. My testimony is submitted on behalf of all three organizations. Carolina Power & Light operates three nuclear power generating units and has one other under construction, at three separate locations. Our H. B. Robinson unit near Hartsville, S.C., has operated for 14 years, and our two-unit Brunswick Plant near Southport, N.C. has operated about 10 years. We are also building the Harris nuclear unit near Raleigh, N.C., which is scheduled for operation next year. We operate both pressurized water reactors and boiling water reactors.

AT THIS TIME, I WOULD LIKE TO DESCRIBE FOR YOU, THE EXPANDED AND SUBSTANTIAL TRAINING THAT IS BEING CONDUCTED IN THE NUCLEAR POWER INDUSTRY TODAY. I URGE THAT THIS BE GIVEN CONSIDERABLE WEIGHT AS YOU CONSIDER THE PROPOSED NUCLEAR POWER PLANT PERSONNEL TRAINING ACT, KEEPING IN MIND THE FACT THAT MOST OF SUCH TRAINING SHOULD BE SITE SPECIFIC FOR THE PARTICULAR NUCLEAR UNIT TO BE OPERATED.

NUCLEAR PLANT TRAINING IS DRAMATICALLY DIFFERENT, BETTER, AND MORE COMPREHENSIVE THAN IT WAS IN 1979 AT THE TIME OF THE TMI INCIDENT. IN 1979, NUCLEAR PLANT TRAINING PROGRAMS BY THE UTILITIES VARIED WIDELY. THEN, SOME WERE VERY MODEST. TODAY, UTILITIES ARE APPLYING THE LATEST TECHNIQUES OF JOB ANALYSIS AND TRAINING PROGRAM DEVELOPMENT TO ENSURE THAT THIS TRAINING IS PERFORMANCE-BASED AND THAT THE REQUIRED KNOWLEDGE AND SKILLS ARE DEVELOPED AND DEMONSTRATED BY ALL OPERATORS. THIS EXPANDED AND SYSTEMATIC APPROACH HAS BROUGHT ABOUT TREMENDOUS IMPROVEMENT IN

TRAINING IN RECENT YEARS. NRC TESTING AND SURVEILLANCE HAVE ALSO BEEN SIGNIFICANTLY EXPANDED. THE INSTITUTE OF NUCLEAR POWER OPERATIONS (INPO) HAS BEEN ESTABLISHED AND WILL ACCREDIT ALL UTILITIES' TRAINING PROGRAMS. YOU WILL HEAR MORE ABOUT THAT EXCELLENT ORGANIZATION FROM ZACK T. PATE LATER.

THE INDUSTRY HAS ADOPTED AN INTEGRATED APPROACH TO TRAINING THAT INCLUDES THE FOLLOWING:

- UTILITY RESPONSIBILITY FOR TRAINING
- INPO GUIDANCE, ASSISTANCE, AND EVALUATION
- ACCREDITATION BY AN INDEPENDENT NATIONAL NUCLEAR ACCREDITING BOARD
- CLOSE MONITORING OF THE INDUSTRY AND OF INDIVIDUAL UTILITIES BY THE NRC.

I KNOW THAT UTILITY CHIEF EXECUTIVE OFFICERS AND SENIOR MANAGERS ARE STRONGLY COMMITTED IN CARRYING OUT THEIR RESPONSIBILITIES TO PROVIDE HIGH QUALITY TRAINING AND TO ACHIEVE ACCREDITATION. I KNOW THE CONCERN WHICH UTILITY SENIOR MANAGEMENT HAS FOR THE SAFE AND EFFICIENT OPERATION OF THEIR NUCLEAR UNITS. NOTHING IN THE ENTIRE ORGANIZATION IS ANY MORE IMPORTANT. IT IS A MAJOR DISCUSSION TOPIC AT INPO WORKSHOPS AND OTHER MEETINGS. ZACK PATE, PRESIDENT OF INPO, HAS TALKED PERSONALLY WITH EACH CHIEF EXECUTIVE OFFICER TO BE SURE THAT TRAINING ACCREDITATION THROUGHOUT THE COUNTRY IS BEING CARRIED OUT ON SCHEDULE.

UTILITIES HAVE TAKEN THE INITIATIVE TO IMPROVE TRAINING BECAUSE OF A FUNDAMENTAL PRINCIPLE THAT WAS RECOGNIZED BY THE KEMENY COMMISSION:

> "RESPONSIBILITY AND ACCOUNTABILITY FOR SAFE POWER PLANT OPERATION, INCLUDING THE MANAGEMENT OF A PLANT DURING AN ACCIDENT, SHOULD BE PLACED ON THE LICENSEE IN ALL CIRCUMSTANCES."

PROVIDING GOOD TRAINING IS A KEY STEP IN MEETING THIS RESPONSIBILITY.

AS I HAVE SAID BEFORE, THERE HAVE BEEN TREMENDOUS IMPROVEMENTS IN UTILITY TRAINING SINCE THE COMPREHENSIVE INDUSTRY INITIATIVE HAS BEGUN:

- NUCLEAR POWER PLANT SIMULATORS ARE NOW RECOGNIZED AS ONE OF THE MOST EFFECTIVE TRAINING DEVICES FOR OPERATORS WHO ARE PEOPLE WHO MOST DIRECTLY AFFECT THE SAFETY OF PLANT OPERATIONS.

IN 1979 THERE WERE 10 SIMULATORS IN OPERATION IN THIS COUNTRY; NOW THERE ARE 70 OF THESE MULTI-MILLION DOLLAR MACHINES OPERATING, UNDER CONSTRUCTION, OR PLANNED.

UTILITIES HAVE ALSO INVESTED HEAVILY IN TRAINING FACILITIES. BY THE END OF 1984, ALMOST 1.6 MILLION SQUARE FEET OF SPACE WERE DEDICATED TO NUCLEAR TRAINING, MORE THAN THREE TIMES AS MUCH AS SIX YEARS AGO.

NOT ONLY HAVE WE PURCHASED SIMULATORS AND BUILT FACILITIES, WE'VE HIRED AND DEVELOPED PROFESSIONAL TRAINERS TO EFFECTIVELY USE THEM. WE HAVE MORE THAN 2100 FULL-TIME TRAINING PERSONNEL, ALMOST 1700 OF WHOM ARE INSTRUCTORS; THAT'S AN AVERAGE OF 22 INSTRUCTORS FOR EACH PLANT THAT'S OPERATING OR UNDER CONSTRUCTION - MORE THAN FOUR TIMES AS MANY AS SIX YEARS AGO. AND WE HAVE IMPLEMENTED FORMAL TRAINING AND CERTIFICATION PROGRAMS FOR THOSE INSTRUCTORS.

- WE'VE INCREASED THE NUMBER OF PEOPLE ON OUR PLANTS' STAFFS, SO THEY HAVE MORE TIME AVAILABLE FOR THEM TO BE TRAINED. FOR EXAMPLE, MOST PLANTS HAVE SIX SHIFTS OF OPERATORS; THE REST HAVE FIVE SHIFTS OR THE EQUIVALENT. THIS ALLOWS ONE SHIFT TO BE DEDICATED TO TRAINING FULL TIME, AND IS QUITE A DIFFERENT SITUATION THAN EXISTED FIVE YEARS AGO.

- THE SCOPE AND MAGNITUDE OF THE INDUSTRY-WIDE TRAINING EFFORT IS MASSIVE. DURING 1983, OVER 6000 PERSONNEL ENTERED UTILITY TRAINING PROGRAMS FOR OPERATOR, TECHNICIAN, AND MAINTENENCE POSITIONS.

LET ME ILLUSTRATE WHAT THE INDUSTRY IS DOING BY DESCRIBING THE EXPANSION OF NUCLEAR TRAINING PROGRAMS AT MY OWN COMPANY OVER THE LAST FIVE YEARS.

CAROLINA POWER & LIGHT COMPANY
1979 VS. 1985

	1979	1984	1985
NUMBER OF NUCLEAR TRAINING PERSONNEL	23	137	141
OPERATING BUDGET	$1,055,000	$10,750,000	$16,100,000

CP&L PRESENTLY HAS 3 NUCLEAR SITES AND $37 MILLION OF CAPITAL INVESTMENT IN TRAINING FACILITIES.

IN THE LAST TWO YEARS, THE TRAINING OF PERSONNEL HAS PROBABLY BEEN THE FASTEST GROWING ACTIVITY IN OUR COMPANY'S NUCLEAR PROGRAM. THERE HAVE BEEN A NUMBER OF CHANGES IN THE CONTENT AND SUBSTANCE OF OUR TRAINING REQUIREMENTS. WE ARE MEETING THE NEED FOR EXPANDED AND STRENGTHENED NUCLEAR TRAINING IN SEVERAL WAYS.

WE HAVE DEVELOPED A WELL-STAFFED, COMPREHENSIVE PROGRAM AT BOTH THE CORPORATE HEADQUARTERS AND AT THE PLANT LEVELS. WE NOW HAVE 141 PEOPLE DEDICATED FULLTIME TO TRAINING. THEY ARE LOCATED

AT OUR HARRIS ENERGY AND ENVIRONMENTAL CENTER NEAR RALEIGH, N.C., AND AT EACH OF OUR THREE NUCLEAR SITES. THIS ALLOWS US TO HAVE THE SPECIALIZED CENTRALIZED RESOURCES REQUIRED FOR A CORPORATE PROGRAM AND, AT THE SAME TIME, TO HAVE ON-SITE TRAINING AT EACH OF THREE PLANTS TO PROVIDE DIRECT SUPPORT.

LAST YEAR WE HAD A TOTAL OF 637 PEOPLE IN OPERATOR TRAINING OR RETRAINING, AS WELL AS 893 PEOPLE IN OUR CRAFT TRAINING PROGRAM--A SUBSTANTIAL PART OF WHICH PERTAINS TO THE SUPPORT OF OUR NUCLEAR OPERATIONS.

A NEW SIMULATOR WAS INSTALLED AT OUR BOILING WATER REACTORS, BRUNSWICK PLANT, IN 1984. WE HAVE HAD A SIMULATOR AT THE HARRIS CENTER FOR OUR PRESSURIZED WATER REACTORS FOR THE ROBINSON AND HARRIS PLANTS SINCE 1977. IN ADDITION, IN 1986, WE PLAN TO ADD ANOTHER SIMULATOR TO BE LOCATED AT OUR ROBINSON PLANT. THAT WILL GIVE US PLANT-SPECIFIC SIMULATORS AT EACH OF OUR THREE NUCLEAR FACILITIES.

A MAJOR STRENGTH OF OUR PROGRAM IS THAT OUR TRAINING STAFF HAS A GREAT AMOUNT OF NUCLEAR PLANT OPERATING EXPERIENCE. OUR VICE PRESIDENT AND DEPARTMENT MANAGER, RESPONSIBLE FOR THE ENTIRE NUCLEAR TRAINING PROGRAM, AND THE MANAGER OF THE NUCLEAR TRAINING PERSONNEL SECTION BOTH HAVE DIRECT MANAGEMENT RESPONSIBILITY TO SUPPORT PLANT OPERATIONS. IN ADDITION, BOTH OF THESE INDIVIDUALS HAVE SERVED AS NUCLEAR PLANT MANAGERS AND HAVE HELD AN NRC SENIOR REACTOR OPERATORS LICENSE. THEIR PLANT EXPERIENCE IS A VALUABLE ASSET TO OUR NUCLEAR TRAINING PROGRAM.

THESE MANAGERS ARE BACKED UP BY A LARGE AND EXPERIENCED PROFESSIONAL STAFF. MOST OF OUR CLASSROOM INSTRUCTORS, ALSO, HAVE DIRECT PLANT EXPERIENCE. WE HAVE A TOTAL OF MORE THAN 500 YEARS OF OPERATING EXPERIENCE IN OUR NUCLEAR TRAINING PROGRAM. THUS, OUR TRAINING STAFF UNDERSTANDS THE ACTUAL PRACTICE AS WELL AS THE THEORY OF OPERATING A NUCLEAR PLANT.

As I have mentioned, we have a training group at each of our nuclear sites. At the two-unit Brunswick Plant, the training group is made up of 26 employees with a total of over 140 years of nuclear experience. We have similar professional staffs at our Harris and Robinson Plants and at the Harris Energy and Environmental Center.

Our training begins with a careful analysis of each job in order to identify the skills and knowledge needed to perform that job. After this analysis, a training sequence is established to teach the students the necessary skills and knowledge. Classes are scheduled for both classroom instruction and trips into the plant where the instructors can refer to the actual equipment in its plant location.

Our training program also incorporates what we call "feedback." This feedback helps us ensure quality control. It

HELPS US ENSURE THAT EMPLOYEES CAN DO THE JOBS THEY WERE TRAINED TO DO.

TO GET FEEDBACK, OUR TRAINING PERSONNEL GOES INTO THE WORKPLACE AND TALKS DIRECTLY WITH EMPLOYEES AND THEIR SUPERVISORS. WE ASK THEM HOW EFFECTIVE THE TRAINING PROGRAM IS AND WHAT, IF ANY, CHANGES NEED TO BE MADE. WE LISTEN . . . AND WE ADJUST OUR PROGRAM AS NEEDED. THIS LETS US DESIGN OUR PROGRAM TO FIT THE REAL WORLD.

FOR NUCLEAR PLANT OPERATORS, THE PLANT-SPECIFIC TRAINING INCLUDES TIME ON ONE OF OUR SOPHISTICATED, COMPUTERIZED NUCLEAR TRAINING SIMULATORS. A SIMULATOR CAN DUPLICATE SITUATIONS AS THEY WOULD OCCUR IN THE ACTUAL CONTROL ROOM OF THE PLANT. OPERATORS LEARN ON A DUPLICATE CONTROL BOARD THAT'S BACKED BY A COMPUTER. THE COMPUTER PROVIDES THE SIMULATOR WITH THE SAME RESPONSE THAT THE PLANT EQUIPMENT GIVES. THERE'S A MAJOR

DIFFERENCE, HOWEVER. THE SIMULATOR ALLOWS STUDENTS TO "FREEZE" A CONDITION ON THEIR CONTROL BOARD -- GIVING THEM TIME TO ANALYZE AND DISCUSS WHAT IS HAPPENING. THE ADDITIONAL TIME IS A VALUABLE TRAINING TOOL. THE NUCLEAR SIMULATOR CAN BE USED TO TRAIN OPERATORS ON EMERGENCY CONDITIONS AS WELL AS DAY-TO-DAY OPERATIONS.

ADDITIONAL BENEFITS OF THE SIMULATOR INCLUDE:

- REDUCTION OF PLANT DOWNTIME BECAUSE WITH A SIMULATOR, THERE'S NO NEED TO PRACTICE ON ACTUAL PLANT EQUIPMENT WHILE IN OPERATION.

- REDUCTION OF COSTS ASSOCIATED WITH SENDING TRAINEES TO SIMULATORS ELSEWHERE IN THE COUNTRY.

- INCREASED MANAGEMENT CONTROL OF SIMULATOR TRAINING.

- Increased use of simulator for related purposes, such as engineering, problem-solving, and human factors research.

- Reduction in plant startup time and cost by allowing crews to have hands-on practice with plant equipment before it's operated.

Once candidates receive their initial license, they must still be requalified at regular intervals. Our training doesn't stop after licensing either. We provide continuing training, both in the classroom and on the job, to requalify our operators each year. This is supplemented by the NRC requalification every two years. In 1983, our Brunswick Plant was the first utility plant in the country to undergo the complete NRC-administered requalification exam, and the results were very successful.

OUR APPPOACH TO TRAINING HAS PROVED TO BE SUCCESSFUL. WE HAVE OBTAINED A HIGH SUCCESS RATE IN THE LICENSING OF PLANT OPERATORS. THIS IS TRUE EVEN THOUGH THE LICENSING EXAM HAS BECOME MORE RIGOROUS AND MORE COMPREHENSIVE. FOR EXAMPLE, AT OUR ROBINSON PLANT DURING THE PAST FOUR YEARS, 36 CANDIDATES HAVE TAKEN THE NRC EXAMINATIONS FOR REACTOR OPERATOR AND SENIOR REACTOR OPERATOR LICENSES, WITH A SUCCESS RATE OF 92 PERCENT. AT THE BRUNSWICK PLANT, RE-QUALIFICATION EXAMS WERE ADMINISTERED IN 1983, AND 13 OUR OF 15 OPERATORS WHO TOOK THE EXAM PASSED THE FIRST TIME AND THE OTHER TWO PASSED SHORTLY THEREAFTER FOLLOWING ADDITIONAL TRAINING.

OUR APPROACH TO NUCLEAR TRAINING EXCEEDS THE MINIMUM NECESSARY TO MEET REGULATORY REQUIREMENTS IN A NUMBER OF WAYS. A GOOD EXAMPLE OF EXTRA EFFORT IS THE TRAINING PROVIDED TO OUR EMPLOYEES WHO WORK IN RADIATION PROTECTION AREAS.

WE HAVE TWO GENERAL EMPLOYEE TRAINING PROGRAMS WHICH MEET ALL THE REGULATORY REQUIREMENTS FOR EMPLOYEES WORKING IN RADIATION AREAS. BEYOND THIS, WE HAVE DEVELOPED A THIRD-LEVEL PROGRAM WHICH PROVIDES ADVANCED HEALTH PHYSICS TRAINING FOR PERSONNEL WHO WORK IN RADIATION AREAS.

OUR NUCLEAR TRAINING PROGRAMS ARE EVALUATED IN DEPTH BY AN INDEPENDENT GROUP FROM THE INSTITUTE OF NUCLEAR POWER OPERATIONS (INPO). THE OUTSIDE TEAM OF EXPERTS DETERMINES WHETHER OR NOT A UTILITY'S NUCLEAR TRAINING PROGRAMS ARE ACCREDITED. THE CONCEPT IS SIMILAR TO THE ACCREDITATION PROCESS COLLEGES AND UNIVERSITIES UNDERGO.

A FIVE-MEMBER ACCREDITATION BOARD APPOINTED BY INPO OVERSEES THIS REVIEW. THE MEMBERS ARE WELL-VERSED IN TRAINING AND EDUCATION, AND REPRESENT A GOOD RANGE OF BACKGROUND AND EXPERIENCE RELATIVE TO NUCLEAR TRAINING.

OUR OPERATOR TRAINING PROGRAM AT THE ROBINSON PLANT WAS ACCREDITED IN MAY 1984. THE OPERATOR TRAINING PROGRAM AT THE BRUNSWICK PLANT WAS ACCREDITED THIS YEAR. OTHER PROGRAMS ARE SCHEDULED FOR ACCREDITATION IN THE NEAR TERM.

IN CLOSING, LET ME REVIEW JUST A FEW OF THE MILESTONES WE'VE ACHIEVED WITH OUR NUCLEAR TRAINING PROGRAM, WHICH WE THINK ARE REPRESENTATIVE OF WHAT OUR INDUSTRY HAS BEEN DOING:

-- IN 1971, 1975, AND 1977, OUR ROBINSON AND BRUNSWICK UNITS WERE COMPLETED AND ENTERED COMMERCIAL SERVICE.

-- IN 1973, WE APPOINTED A FULL-TIME TRAINING COORDINATOR AT EACH NUCLEAR PLANT.

-- IN 1977, WE INITIATED A COMPREHENSIVE STUDY OF OUR COMPANY'S TRAINING NEEDS. THAT STUDY LED TO THE BASIC APPROACH AND ORGANIZATION WE HAVE TODAY.

-- In 1977, we organized the first unit in the Company solely dedicated to organizing and coordinating training for plant employees.

-- Also in 1977, CP&L became the first utility in the Southeast to acquire a simulator for a commercial nuclear power plant.

-- In 1978, we formed a unit to provide specialized training for craft workers.

-- In 1982, we began developing the follow-up evaluation and feedback technique I discussed earlier.

-- In 1983, the Brunswick Plant became the first plant in the nation to undergo a complete NRC requalification exam for plant operators.

-- In 1984, the Robinson Operator Training Program was accredited by INPO.

-- Earlier this year, the Brunswick Operator Training Program was accredited by INPO.

As time goes on, you should expect to hear more good things about training programs throughout the industry, and the nuclear plants they support.

As stated at the beginning of my remarks, we support a comprehensive industry system to ensure that nuclear power plant personnel have the required knowledge and skills. But, as I have described, I believe that we have already established an effective program system within the industry, which is working effectively through the Institute of Nuclear Power Operations and the individual utilities themselves, subject to the general regulatory oversight by the NRC of nuclear plant operations.

WE WELCOME YOUR INTEREST IN THE TRAINING OF OUR PEOPLE TO SAFELY AND RELIABLY OPERATE THIS NATION'S NUCLEAR POWER PLANTS. WE ASSURE YOU OF OUR DEDICATION TO THIS IMPORTANT TASK. WE BELIEVE, HOWEVER, THAT THE ESTABLISHMENT OF A FEDERAL FACILITY AS NOW DESCRIBED IN THE PROPOSED ACT WOULD NOT BE THE BEST WAY TO PROCEED, BUT THAT CONTINUING IMPROVEMENTS IN TRAINING CAN BEST BE ACHIEVED THROUGH THE INITIATIVES CURRENTLY IN PROGRESS THROUGHOUT THE INDUSTRY.

CP&L
Carolina Power & Light Company
P O Box 1551 • Raleigh, N C 27602
(919) 836-6382

June 17, 1985

SHERWOOD H SMITH JR
Chairman/President

The Honorable Daniel P. Moynihan
United States Senate
464 Russell Senate Office Building
Washington, DC 20510

Re: **National Nuclear Power Plant Personnel Training Act of 1985 (S.16)**

Dear Senator Moynihan:

This is in reply to your recent letter on the above-referenced legislation. We appreciate this opportunity to offer comments and share what our Company is doing to meet the continuing challenges in nuclear plant training, management and operation.

We operate two boiling water reactors (BWRS) at our Brunswick Plant near Wilmington, North Carolina, and one pressure water reactor (PWR) at our H. B. Robinson Plant in Hartsville, South Carolina. A second PWR is under construction at our Shearon Harris Nuclear Plant near Raleigh, North Carolina.

While we support the objectives that are the basis for your legislation, we perhaps differ in how we feel those objectives can best be met. We do strongly agree, however, that proper training and management are essential for the safe operation of our nuclear facilities.

Through the Institute of Nuclear Power Operations (INPO), industry initiatives, as well as those of our Company, have been directed toward the establishment of benchmarks of excellence in operator training, plant operation and plant maintenance. Even with INPO's guidance and assistance, however, operator training and plant operation is best left to the licensee. We are continually faced with the challenge of doing more than just simply satisfying NRC requirements to assure that our personnel understand their tasks and the equipment they operate.

For your perusal you will find attached a list of CP&L-specific commitments and accomplishments relative to our nuclear training and operation as well as a review of industry progress. I believe you will find a thorough review of INPO's ongoing activities and accomplishments to date quite impressive, and I commend such a review to you and your staff.

Thank you for the opportunity to share these thoughts and facts with you. Please don't hesitate to call on me if you have any further questions about our operations.

Sincerely,

Sherwood H. Smith, Jr.

SHSJr:ew

Enclosure

CAROLINA POWER & LIGHT COMPANY
COMMITMENTS AND ACCOMPLISHMENTS

The following activities have been completed or are in progress for our nuclear programs:

- Senior corporate managers at all reactor sites with full site control
- New training facilities at plant sites.
- Reactor training simulators for each plant.
- Implementation of post-TMI plant modifications.
- Rewrite of plant procedures to minimize potential for error.
- Formal improvement programs for plant operations.
- Strong corporate commitments for radiation dose reduction and ALARA principles.
- Six shift rotation for reactor operators.
- INPO certification of training programs.
- Major increases in plant staffing and experience levels.
- Independent nuclear safety review by plant based engineers.
- Increased usage of computers for commitment tracking.
- Increased staff support - Training, Quality Assurance, Health Physics, Engineering.
- Improved management and technical training programs.
- Positive performance evaluations by outside organizations.
- Corporate commitment to excellence.

Examples of Industry Progress

- The Institute for Nuclear Power Operations (INPO) has been created to promote the highest standards for nuclear plant safety, reliability, and operations. With a full-time staff of approximately 400 employees, the organization has been an effective force in improving industry operations.
- Nuclear utilities have constructed extensive new training facilities that provide hands-on training with complex equipment. Since 1979, training facilities in nuclear plants have been increased by 252%.
- The number of full-time utility training personnel per plant has increased by 376%, and the number of employees who hold or have held NRC licenses has been increased by 182%.

- The percentage of plants having formal training and certification for their technical instructors (not a regulatory requirement) has increased from 19% in 1979 to 67%.
- The number of full-scope control room simulators in operation or planned has increased from 10 to 69 since 1979.
- Training budgets, as a fraction of operating budgets, have increased by 129%.
- The percentage of plants operating with six shift crews has increased from 15% to 52%. Other utilities have established equivalent arrangements to allow one full shift to be dedicated to training.
- The number of permanent engineering personnel per plant supporting plant operations has increased by 82% since 1979.
- All utilities have established administrative radiation exposure limits below Federal regulations.
- The number of workers exceeding 5 rem exposure has decreased by more than 70% since 1980, and in 1983 only one person out of the tens of thousands in the nuclear industry exceeded the regulatory exposure limit of 3 rem per quarter.
- Between 1980 and 1983, the average number of unplanned reactor trips per year for commercial operating units while synchronized to the grid were reduced from six to four.
- Lost time accidents have been reduced by almost 75% since 1979.

CP&L
Carolina Power & Light Company
P. O. Box 1551 • Raleigh, N. C. 27602
(919) 836-6382

SHERWOOD H. SMITH, JR.
Chairman/President

August 28, 1985

Honorable Daniel Patrick Moynihan
United States Senate
464 Senate Russell Office Building
Washington DC 20510

Dear Senator Moynihan:

This responds to your letter of July 9 requesting answers to several questions resulting from my testimony on June 27 before the Senate Environment and Public Works Subcommittee on Nuclear Regulation.

The list of your questions and my reply is enclosed.

Sincerely,

Sherwood H. Smith, Jr.

SHSjr/k

Enclosure

1. **Admiral H. G. Rickover and others have observed that one problem plaguing nuclear utilities is their inability to attract and keep educated reactor operators. What steps is the industry taking to ensure an adequate and stable operational force? How would you characterize the professionalism and espirit d'corps of reactor operators and other plant operations personnel?**

Answer

There are a number of career incentives in the nuclear industry to attract and keep bright and talented employees. We try to offer appropriate and attractive arrangements to achieve high morale for the total nuclear plant workforce. For example, at Carolina Power & Light the following measures have been implemented to make work in the nuclear plants more attractive:

- Supplemental pay for reactor operators and other key nuclear workers stationed at plant sites
- Increases in bonus pay for RO and SRO Licenses
- Cash incentives for those achieving high scores on NRC RO and SRO examinations
- A promotional program tied to training that allows each worker to progress to top of each job classification
- Increased hiring of local area personnel
- Piloting of alternative shift schedules
- Company-wide incentive goals that provide additional compensation based on goal achievement

At present, there is some concern among some plant operators brought about by proposed NRC changes in the requirements for achieving and maintaining the operator license. However, in my opinion, the general esprit d'corps of the nuclear plant operating personnel is excellent; although, there are variations between plant locations around the country.

2. What is meant by "performance-based" training or a "systems approach" to training? Do these terms suggest rote training? One nuclear engineer suggested to me a "trend toward rote training and a morass of paperwork," noting the "memorization of tens or hundreds of pages of special procedures, operating procedures, and emergency procedures cannot possibly lead to increased safety, but instead promotes automation-like and inane responses." Do you agree with this assessment?

Answer

The term "systematic approach" or "performance-based training" is used to describe an approach where the job is analyzed to determine what skills the job requires and what training is required. The systematic approach consists of five steps (from NUREG/CR 3750):

1. Systematic analysis of the job to determine what the performers must be able to do (Job and Task Analysis).

2. Derivation of performance-based learning objectives from that analysis.

3. Implementation of training that has been derived from the learning objectives.

4. Trainee evaluation in training according to the performance standards stated in the learning objectives.

5. Training program evaluation and revision based on the trainee's ability to perform in the actual job setting.

The systematic approach does involve repetition, but it does not suggest rote training or an excess of paperwork. Rather, it suggests the opposite--a deliberate, manageable approach to training which provides clear guidance on what the trainee is expected to accomplish in the course.

There are some reactor operator emergency procedures which do need to be memorized and practiced regularly on a simulator to demonstrate competence. These emergency events are generally small in number and constitute a small part of the overall training program.

Carolina Power & Light Company has recently converted its narrative emergency procedures to a symptom-based flow path format. This format reduces many pages of written instruction to a graphical flow path which is mounted on a single placard easily handled by the operators. This technique, which reduces the amount of memorization required, has received enthusiastic endorsement from the licensed operators.

3. **The Navy's Nuclear Power School course lasts six months and consists of 700 hours of classroom instruction. Compare the Navy's program of classroom instruction to the typical utility's.**

Answer

A typical utility training program for reactor operators to be licensed by the NRC averages 1600 hours (1984 INPO Survey of Nuclear-Related Training Activity) of classroom instruction. Depending on the utility, this training may be consecutively scheduled (as in the Navy program) or it may be scheduled in phases spread over several years. Utility operator training programs typically are a composite of classroom work, on-the-job training, simulator training, and research reactor experience. In Carolina Power & Light Company's case, this training through the RO level totals about 2280 hours in the classroom, 160 hours of simulator training, 80 hours at a research reactor, and 1480 hours of on-the-job training. An additional 28 weeks (1120 hours) of classroom, simulator, and on-the-job training are provided for SRO candidates.

4. **Admiral Rickover commented, "We train our people in theory because you can never postulate every accident that might happen." Does the utility take the same approach?**

Answer

The nuclear industry does include theory in its training program. Admiral Rickover is correct when he states that you can never postulate every accident that might happen. Understanding the behavior of the plant and the characteristics of plant performance is, without doubt, a vital part of a quality training program for operating personnel. This understanding is reinforced by practice in reactor startups on simulators or research reactors and practice in handling accidents and transients on simulators.

As part of the INPO Accreditation Program for nuclear utilities, each job position is analyzed in detail to determine what skills and knowledge must be taught. This Systematic Approach to Training (SAT model) determines which topics, theoretical or otherwise, need to be addressed. In my opinion, industry, INPO, NRC, and the educational community as a whole, believe this is an effective approach to training program design and curriculum development.

5. **Admiral Rickover endorsed the idea of an industry organization such as the Institute of Nuclear Power Operations (INPO), but in a recent phone conversation, he said, "make it public." Can or should INPO share information with the Nuclear Regulatory Commission (NRC) and the public? To what extent would such a course hinder INPO? What about the public's right to know? How can we be sure the National Nuclear Accrediting Board is doing its job if we do not have access to the information it uses to reach its conclusions?**

Answer

A great deal of information is being provided to the NRC and to the public. I can say, as a nuclear utility CEO, that I support the efforts of INPO to establish levels of excellence throughout the nuclear industry. I would oppose any restrictions on their efforts that would reduce their effectiveness and result in the pursuit of minimum regulatory standards. Since I did not participate in the reported telephone conversation with Admiral Rickover, for whom I have the utmost respect, it is difficult to comment on the phrase "make it public." I have personally met with Admiral Rickover in the past and visited the Navy Nuclear Training Facility at Idaho Falls with him. The INPO leadership has largely come from his Navy program which for various valid reasons, of course, was not "made public."

As to the question on the accreditation process, the National Nuclear Accrediting Board is made up of senior utility managers, training experts from outside the nuclear field, representatives from the post-secondary educational community and individuals nominated by the NRC.

The Board is provided staff support by INPO but is totally independent in its decision making. INPO makes public the accreditation criteria and procedures, membership on the Board, and the list of plants that have achieved accreditation. The NRC can review all materials used by a Board member in reaching a decision. In the board meetings to consider Carolina Power & Light Company's programs, a member of the NRC staff has attended.

6. **Should reactor operators be required to have engineering degrees? Should the NRC require the examination and licensing of plant personnel other than candidates for the operator senior operator's licensees? What about construction, maintenance, and repair personnel? Are operations personnel technicians or professionals?**

Answer

Operators are carefully screened, extensively trained, and federally licensed to safely operate our nuclear plants. This is a demanding job requiring individuals with extensive knowledge and mature judgement. Their performance through the years has resulted in no injury to members of the general public, a record unmatched in U.S. industry. In these respects, operators are highly qualified professionals. I intend to do all I can to reinforce and enhance professionalism of our operators.

We do not believe reactor operators need engineering degrees. The extensive job analysis already described does not support a degree requirement. Good reactor operators possess a unique combination of technical knowledge, operational skills, leadership qualities and power plant experience. Requiring operators to have an engineering degree does not ensure these attributes.

In my view, there is no need to license skilled construction, maintenance and repair personnel. Their skills are satisfactorily determined through performance evaluations, and training is provided where necessary to support job performance needs. The INPO accreditation program for training of maintenance and technical classifications offers assurance of quality and consistency in those programs.

7. Should utility managers have technical expertise? Should they be trained?

Answer

Utility managers are chosen for their positions based on a combination of technical ability, managerial skill, and leadership qualities. While there are a number of basic requirements, the need for a high level of technical knowledge decreases as an individual progresses up the management chain. Technical expertise is important for certain levels of managerial assignments but not a requirement for all levels. At Carolina Power & Light Company, nuclear managers through the plant general manager level receive SRO equivalent training, and many managers in the Company above that level have been licensed or received similar training. The INPO accreditation program covers technical staff and managers at the plant level.

8. **Is INPO likely to suspend the membership of a utility unwilling or unable to upgrade its training programs?**

Answer

Yes, in my view INPO would be very likely to, and should, suspend membership of a utility that does not achieve accreditation of its training programs or does not satisfy appropriate safety practices in the operation of its nuclear plant.

It should be recognized that INPO has established benchmarks of excellence for the nuclear industry. All utilities with operating nuclear plants or plants under construction are members of INPO. In the unlikely event a utility should be unwilling to upgrade its training program, INPO can exert strong leverage to bring about changes and the appropriate corrective action. Peer-group pressure is a powerful force in the effort to maintain and improve the standards of excellence. Also, industry insurance programs involve participation in INPO.

9. **The public perception of the safety of nuclear power is not good. Will industry efforts coordinated by INPO be sufficient to restore credibility in the industry? Or would some sort of federal training academy, operated in conjunction with INPO and subject to NRC and congressional oversight, do more to increase public acceptance of nuclear power?**

Answer

We do not believe the establishment of a federal training academy would increase the public acceptance of nuclear power. The credibility of nuclear power in the U.S. reached a low in the aftermath of the accident at TMI, but since then much has been done to correct this. Recent national surveys have shown improvement in the public support of nuclear power. The substantial record of safe and reliable plant operations since TMI has done much to restore public confidence in nuclear power, especially with some of our plants setting world records for continuous operation. Nuclear utility efforts and those of INPO are focused on assuring the safe and reliable operation of our plants and our industry as a whole is committed to a number of initiatives which will result in even further improvements in nuclear operations.

Federal recognition and support of industry initiatives which strive to achieve excellence can do much to help improve public perception of the nuclear industry.

10. If INPO and the utilities are convinced of the soundness of their training programs and the safety of their operations, would you waive Price-Anderson liability limits for accidents attributable to human error?

Answer

The purpose of the Price-Anderson insurance system is to provide compensation for legitimate claims in the unlikely event of a nuclear accident having substantial off-site consequences. Compensation is assured to the public without proof of negligence, and on the other hand, liability is established with a maximum limit. The limit on liability is, for both legal and policy reasons, a necessary element of the Price-Anderson system. This is true regardless of what might possibly cause an accident.

The limit on liability in the Price-Anderson system is quite independent from the greater incentives for utilities to improve operator training. One could ask the same waiver question about equipment.

Through the individual utility and INPO efforts, the industry should and will continue to improve its record concerning the operation of nuclear power, and the effectiveness of its training programs.

Testimony to
Subcommittee on Nuclear Regulation
Dr. Zack T. Pate
President and CEO
Institute of Nuclear Power Operations
June 27, 1985

INTRODUCTION

Good morning, my name is Zack T. Pate. I am President and Chief Executive Officer of the Institute of Nuclear Power Operations, INPO, in Atlanta, Georgia.

INPO was formed by the U.S. Nuclear Utility Industry to promote the highest standards of safety and reliability in the operation of its nuclear power plants. The industry took the initiative to form the Institute in late 1979 to apply the lessons learned from the Three Mile Island (TMI) accident.

INPO, a non-profit organization, has a staff of just over 400, and a 1985 budget of $42.7 million.

The Institute's original charter outlined its role in four areas as follows:

- the evaluation of operating nuclear plants
- the analysis of nuclear plant events and the dissemination of operating experience among nuclear utilities
- training and accreditation
- assistance (for example, in 1984, INPO provided 99 special assistance visits to utilities in many areas of nuclear plant operations and maintenance)

Attached to this testimony is the "Institutional Plan for the Institute of Nuclear Power Operations,"* a document that describes these four areas and the INPO programs and activities in each.

Also attached is INPO's 1984 Annual Report, "Resources, Action, Results."* This report describes industry actions in response to recommendations by the President's Commission on the Accident at Three Mile Island, the Kemeny Commission. As the report shows, the eight recommendations that are within INPO's jurisdiction have been implemented. We request that the Institutional Plan and Annual Report be made a part of this testimony.

TRAINING AND ACCREDITATION

TMI demonstrated the important role that training plays in nuclear power plant safety and reliability. Accordingly, the industry assigned INPO major responsibilities in training. In a wide range of areas, the Institute assists and monitors its member utilities in developing, implementing and maintaining high quality, comprehensive training.

INPO evaluates utility training programs through the ongoing operating plant evaluation program and analyzes industry events to identify needed training improvements. The Institute facilitates cooperative sharing of information and training materials among utilities, in addition to providing extensive assistance to utilities in the area of training program development.

The following are specific examples of INPO training activities:

---

*Retained in committee files.

- INPO has developed 17 training and qualification guidelines based on input from the industry and the results of a systematic analysis of jobs and tasks in key nuclear plant positions. These guidelines outline the course content needed for the training and qualification of personnel in nuclear power plant positions. These guidelines are as follows:

1) Pressurized Water Reactor Control Room Operator, Senior Control Room Operator and Shift Supervisor Qualification
2) Boiling Water Reactor Control Room Operator, Senior Control Room Operator and Shift Supervisor Qualification
3) Nuclear Power Plant Requalification Program for Licensed Personnel -- Guidelines for Requalification Training and Education
4) Nuclear Power Plant Non-Licensed Operators -- Guidelines for Qualification Programs
5) Technical Instructor Training and Qualification
6) Simulator Training Guidelines
7) Nuclear Power Plant Operating Staff -- Guidelines for Heat Transfer, Fluid Flow and Thermodynamics Instruction
8) Nuclear Power Plant Operating Staff -- Guidelines for Training to Recognize and Mitigate the Consequences of Core Damage
9) Nuclear Power Plant Shift Technical Advisor -- Recommendations for Position Description, Qualifications, Education and Training
10) Technical Development Programs for Technical Staff and Managers
11) Guidelines for Mechanical Maintenance Personnel Qualification Programs
12) Guidelines for Electrical Maintenance Personnel Qualification
13) Guidelines for Instrument and Control Technician Qualification
14) Radiological Protection Technician Qualifications
15) Chemistry Technician Qualification

16) General Employee Training

17) Guidelines for Quality Control Inspector and Nondestructive Examination Technician Training

- Also, using industry expertise and experience, a detailed job analysis, followed by a detailed task analysis, has been conducted for key nuclear plant positions. Job analysis determines the tasks performed by each position, and an analysis of each task determines the knowledge and skills needed for each position. A computer data base at INPO contains this information. The job and task analysis approach identifies training requirements for plant personnel and aids utilities in making sure that their training programs are comprehensive.

Job and task analysis has been completed for the following positions:

-- shift supervisor

-- control room operator

-- senior control room operator

-- plant equipment operator

-- instrument and control technician

-- chemistry technician

-- radiological protection technician

-- electrical maintenance technician

-- mechanical maintenance technician

- The Institute sponsors workshops and special seminars for utility training personnel to assist them in developing their own training systems. Training and accreditation is often a major subject at other workshops, such as those for utility chief executive officers, nuclear plant managers and other technical disciplines.

- During its regular plant evaluations for each utility, INPO evaluates the training programs and the work of plant personnel to assure continuing training quality. INPO observes and evaluates the actual workplace application of the knowledge and skills taught in the classroom and in simulator training.

All of these activities are designed to assist member utilities as they improve and upgrade their training programs for nuclear plant personnel.

INPO also manages an industrywide accreditation program for utility training programs, which I will discuss later when I describe standards of excellence for training in the industry.

The need for the work INPO is doing in training and nationwide accreditation was recognized by the President's Commission on the Accident at Three Mile Island, the Kemeny Commission, when it recommended the establishment of "agency-accredited training institutions" for nuclear plant operators.

INPO's efforts were also recognized by the Nuclear Safety Oversight Committee, appointed by the President of the United States in 1980 to assess the progress of government agencies and the industry in improving nuclear plant safety. The Committee, in an April 17, 1981, letter to the President of the United States pointed out its belief that INPO's efforts would result in better training for nuclear power plant operators:

> "The nuclear industry, through its Institute of Nuclear Power Operations (INPO), has taken steps to improve personnel training and to develop new training curricula. As a result, we believe that the overall competence of personnel within the industry will be improved as will uniformity of standards throughout the industry."

The committee also looked into the need for a centralized academy to train the nation's nuclear power plant operators. Its members concluded that existing and planned utility efforts best meet the need for competent, well-trained nuclear personnel:

> "We believe that the overall technical quality and expertise of a utility organization can actually be enhanced by in-house training. Given the diversity of utility organization and reactor types, there are strong arguments for allowing training programs to evolve from the existing environment rather than superimposing one national pattern."

In December 1980, Congress enacted the "Nuclear Safety Research, Development, and Demonstration Act of 1980" that was signed into law by the President. Section 6 of this Act directed the Secretary of Energy to "consider the establishment of an academy to train corps of professionals in all aspects of nuclear technology, nuclear operations, nuclear regulatory and related law, and health science." In December 1981, the Department of Energy (DOE), completed its study and issued its report concluding:

> "The commercial nuclear industry recognizes its manpower requirements and the importance of having qualified, trained personnel, and is taking actions to satisfy these needs."
> The study recognized INPO's industrywide programs to upgrade nuclear plant training and stated that these INPO efforts "should meet the industry's personnel needs in terms of quantity, quality and timeliness."

INPO, from the outset, recognized the need for uniform training standards throughout the industry. In September 1980, INPO formed a task force made up of industry representatives to look into the feasibility of national or regional training centers. This group determined that training would best be accomplished at or near nuclear plants and conducted by the individual utilities responsible for plant operation. The task force considered the following elements:

- Each plant is unique, as a result of the various approaches in design and construction that have been applied in the United States. Therefore, much of every training program must be "customized."

- Recurrent or requalification training is a major part of a nuclear utility's total training effort. This training should be given frequently and, under an INPO-managed accreditation program, hundreds of people will be involved at the typical nuclear station. Therefore, this training should be done in close proximity to the nuclear station and the homes of the personnel involved. Requalification training programs also require the use of many plant-specific training aids, including simulators.

- Utilities recruit extensively in the local service area. There was major concern that if employees were sent to central training facilities, they potentially could be diverted away from returning to the utility upon graduation. In the central academy concept, some utilities would not get back the people they sent. This would destroy their incentive for recruiting for the academy. If the recruiting were done by a central organization and the graduates parcelled out to the utilities, many of the graduates would shift jobs. Stability of the utility work force, one of our strongest assets at present, could be undermined.

- Last, and perhaps of the most importance, the utility's responsibility for the quality of its work force would be lessened. There could be a tendency to blame some problems on the quality of graduates supplied by a federal academy. Utility responsibility for the safe and reliable operation of its plants is one of the industry's strongest assets and one of its best safeguards against a serious accident.

After TMI, utilities launched aggressive programs to upgrade the training for nuclear power plant personnel. Each individual utility is responsible for establishing ongoing, comprehensive and systematic training programs to develop highly qualified, well-trained operating personnel.

INPO and the industry determined that a nationwide accreditation program was needed to ensure high standards in nuclear plant training programs. INPO began developing objectives and criteria for accreditation and in 1982 issued the first formal criteria for the Accreditation Program.

As a condition of membership in INPO, each of INPO's 55 member utilities -- every U.S. utility that owns, operates or is constructing a nuclear power plant -- has committed to achieving and maintaining accreditation, not only for operators, but for all of the 10 key positions involved in nuclear power plant operations. These positions are as follows:

- nonlicensed operator
- reactor operator
- senior reactor operator/shift supervisor
- shift technical advisor
- instrument and control technician
- electrical maintenance personnel
- mechanical maintenance personnel
- chemistry technician
- radiological protection technician
- technical staff and managers

The first utility training programs were accredited in 1983. The accreditation process has three steps:

- First, using the accreditation objectives and criteria, the utility performs a self-evaluation to identify and correct weaknesses in its training programs. The utility develops a comprehensive report that describes how the accreditation criteria are being met. This report is sent to INPO.

- Second, an accreditation team, made up of training experts from INPO and utilities, visits the plant and evaluates the training programs. The team's recommendations, along with the utility's responses, are presented to the National Nuclear Accrediting Board in a written report.

- Third, the decision to award or defer accreditation is made by the National Nuclear Accrediting Board.

The National Nuclear Accrediting Board includes four categories: senior utility representatives, training experts from outside the nuclear field, representatives from the post-secondary educational community and individuals nominated by the U.S. Nuclear Regulatory Commission.

The majority of the Board members are from outside the nuclear utility industry. Because of the large number of training programs involved in the industry's accreditation effort, the board includes enough members to ensure representation from each category at each of its frequent meetings. All categories must be represented to make a decision to award or defer accreditation.

Members of the full Board are as follows:

NON-NUCLEAR INDUSTRIAL TRAINING CATEGORY

John E. Carroll
Vice President, Training (retired)
United Airlines

Edward R. Jones, Ph.D.
Chief Human Factors Engineer
McDonnell Douglas Corporation

George E. Moore
Director, Education Department (retired)
Westinghouse Electric Corporation

Charles J. Sener
Assistant Vice President (retired)
Bell Communications Research, Inc.

POST-SECONDARY EDUCATION CATEGORY

William R. Kimel, Ph.D.
Dean, College of Engineering
University of Missouri -- Columbia

Russell R. O'Neill, Ph.D.
Dean Emeritus, Engineering and Applied Science
University of California, Los Angeles

John M. Palms, Ph.D.
Vice President for Academic Affairs
Emory University

Robert L. Seale, Ph.D.
Head, Department of Nuclear and Energy Engineering
University of Arizona

UTILITY CATEGORY

Dennis E. Gilberts
Senior Vice President, Power Supply
Northern States Power Company

John M. Griffin
Senior Vice President, Energy Supply
Arkansas Power and Light Company

Wayne H. Jens, Ph.D.
Vice President, Nuclear Operations
The Detroit Edison Company

Cordell Reed
Vice President
Commonwealth Edison Company

Samuel J. Tuthill, Ph.D.
Senior Vice President, Energy Production
Iowa Electric Light and Power Company

C.O. Woody
Vice President, Nuclear Operations
Florida Power and Light Company

NRC NOMINEE CATEGORY

Lincoln Clark, Jr.
Associate Director of Nuclear Reactor Laboratory and
Director of Reactor Operations
Massachusetts Institute of Technology

Frank C. Fogarty
Associate General Manager, Experimental Programs
EG&G Idaho, Incorporated
Idaho National Engineering Laboratory

Forrest J. Remick, Ph.D.
Associate Vice President For Research
Pennsylvania State University

Gordon E. Robinson, Ph.D.
Professor, Nuclear Engineering
Pennsylvania State University

The National Nuclear Accrediting Board is charged with seeing that nuclear plant training programs meet the INPO criteria. The Board is provided staff support by INPO but is totally independent in its deliberations and decision-making process.

When training programs come before the board, members examine the report of the accreditation team and the utility's responses, as well as the utility self-evaluation report. The Board's final decision comes only after its meeting with senior utility management representatives, including management representatives from the plant and training staffs. This is a meeting that involves page-by-page review of the written report, and it is followed by private deliberations by the Board to determine whether the training programs meet the accreditation criteria.

INPO requires a status report every two years after the utility achieves accreditation. Further, full reaccreditation is required once every four years.

As mentioned, each utility has committed to achieving accreditation. There are numerous utility initiatives in the training area that exemplify this commitment, and Mr. Sherwood Smith, Chief Executive Officer at Carolina Power and Light Company, has covered several of these.

INDUSTRY PERFORMANCE

The industrywide accreditation program encompasses the training programs that directly impact all areas of nuclear plant operation. In many of these areas, INPO is monitoring aspects of nuclear plant performance that relate to plant safety and reliability. INPO has developed an industrywide Performance Monitoring Program that assists its member utilities in keeping a close watch on station performance.

The INPO 1984 Annual Report, attached to this testimony, outlines this performance monitoring effort. We have has identified over 30 parameters related to nuclear plant operational performance. Data on these parameters is collected, analyzed, and disseminated to assist the industry in monitoring, setting goals, and improving plant performance.

Attached to this testimony is a folder entitled "Performance Indicators for the U.S. Nuclear Utility Industry."* This brief document details nine selected performance indicators as follows:

- significant events per unit
- unplanned automatic scrams
- industry forced outage rate
- collective exposure per unit
- solid radioactive waste shipped per unit
- personnel exceeding five rem at one facility
- lost time accident rate
- industry equivalent availability
- thermal performance

Performance monitoring is a relatively new INPO effort designed to measure the results and effectiveness of industry's attention to training and other key plant activities. Performance monitoring provides INPO and the industry feedback not only on how a plant's trained operators and technicians are performing, but also on how the industry as a whole is progressing.

Quoting from the performance indicator folder: "It is widely recognized that nuclear plants with high equivalent availability, small numbers of forced outages, few unplanned scrams, few significant events and low personnel radiation exposures are generally well-managed overall. Such plants are more reliable and can be expected to have higher margins of safety." The graphs in this document show a clear pattern of industrywide progress. I believe improved training has been a key factor in achieving this progress.

---

*Retained in committee files.

Let me return specifically to the industrty's training accomplishments. A comprehensive, aggressive, nationwide program is in place to ensure that utilities achieve the high standards needed in their nuclear plant training programs. We realize that as an Institute and as an industry, we have not kept this committee and Congress adequately informed of this extensive work.

The work by INPO and the industry were formally recognized in March of this year by the NRC through its Policy Statement on Training and Qualification. This Policy Statement notes that utilities should adopt a systematic approach to training and qualification. It also recognizes the industry accreditation process as an effective means of ensuring that utility training is performance-based and establishes specific NRC activities designed to independently monitor improvement in industry training programs. The Policy Statement was issued as a result of strengthened commitments by all utilities to achieve accreditation.

CONCLUSION

In summary, we have put in place the structure for an effective national training and accreditation program, operated by the private sector, but allowing ample opportunity for overview and assurance of high standards by the government.

The Institute of Nuclear Power Operations has set high standards for training of nuclear power plant personnel. As a condition of membership in INPO, every utility has committed to meet these standards and to achieve and maintain accreditation. The independent National Nuclear Accrediting Board ensures that training programs measure up to these high standards. We believe that this structure, in substantial measure, meets the intent of Senate Bill 16.

We, therefore, request your encouragement and endorsement of the INPO-managed programs as described this morning, and as outlined in the documents furnished with this testimony. We will be pleased to work with your staff, the NRC and the DOE to enhance and improve the structure I have described.

Subject to your questions, this concludes my testimony.

INPO

Institute of
Nuclear Power
Operations

1100 Circle 75 Parkway
Suite 1500
Atlanta, Georgia 30339
Telephone 404 953-3600

June 18, 1985

The Honorable Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

Your letter of May 6 requested our comments on the National Nuclear Power Plant Personnel Training Act of 1985. I appreciate the opportunity to comment on this important matter. At INPO we strongly believe in the importance of personnel training in promoting nuclear plant safety.

During the past several years, the nuclear power industry and the Institute of Nuclear Power Operations (INPO) have made substantial improvements in the quality of industry training. Many of the training improvements intended to result from the proposed Training Act have been accomplished or are now being implemented. We believe that any Congressional or other federal government actions should take these extensive efforts into account.

INPO now has a staff of 400 dedicated individuals working to help the industry achieve the high level of performance that we all desire. The INPO staff includes experienced professionals, many from the nuclear Navy and others who came from nuclear utilities, reactor vendors, engineering and consulting firms, educational institutions and agencies, and other backgrounds needed to meet our objectives. INPO's major functions include:

- evaluating utility performance against standards of excellence
- analyzing industry events and sharing the results with all utilities
- evaluating and accrediting utility training programs

The nuclear industry's plans for upgrading training were developed during 1980 and 1981, shortly after INPO was formed. INPO initially planned its programs based on input from utilities with good training programs and from the weaknesses identified during early plant evaluations. In addition, many of our programs were designed to implement the recommendations of the President's Commission on the Accident at Three Mile Island (The Kemeny Commission). The enclosed INPO 1984 annual report, "Resources, Actions, Results," summarizes our responses to the Kemeny Commission recommendations. During 1980, several training-related studies were initiated:

- Congress directed the Department of Energy (in the Nuclear Safety Research, Development, and Demonstration Act of 1980) to study the need for a Federal Nuclear Operations Corps and for the establishment of a national academy.
- INPO formed a task force to study the need for centralized, regional training centers.
- The President appointed a Nuclear Safety Oversight Committee to assess the nuclear industry's progress in a number of areas, including technical education and training.

These studies were all completed during 1981. Their conclusions and recommendations were in general agreement and formed the basis for the approach and structure that the industry, in cooperation with DOE and NRC, developed for the conduct, evaluation, and oversight of nuclear plant training. That approach incorporated four fundamental concepts:

- The conduct of training remains the responsibility of individual utilities who operate nuclear plants and the training facilities located at or near those nuclear plants. A systematic approach to performance-based training is applied by all utilities.
- INPO establishes training standards and recommendations, evaluates training programs, and evaluates plant operations and industry events to identify needed training improvements. INPO also provides appropriate assistance to utilities and facilitates cooperative sharing of information and training materials among utilities.
- An independent National Nuclear Accrediting Board determines whether a plant's training meets the standards set by the industry.
- The NRC monitors industrywide training improvements and the performance of individual utilities.

Extensive work has been done to implement this approach. The results achieved to date are impressive. In 1980, INPO evaluators frequently visited utilities where training was conducted in a temporary structure or construction trailer by a training coordinator and a few instructors. There were only a few simulators in use, and they were used only for mandatory training. Today, as described in the enclosed brochure, "Training: A National Accomplishment", all of that has changed:

- Large, modern training facilities are the norm. Utilities have almost 1.6 million square feet of space dedicated to nuclear training, more than three times as much as five years ago.
- Almost every plant will soon have easy access to a simulator that is a replica of its control room. There are now 70 control room simulators in operation, under construction, or planned, as compared to 10 in 1979.
- A typical plant training staff includes more than 20 full-time instructors. This is over four times as many as five years ago.

The key ingredient in the industry plan for high quality, performance-based training is the accreditation process, and the key part of this process is the National Nuclear Accrediting Board. The Board is provided staff support by INPO, but is totally independent in its deliberations and in its decision-making process. It has the responsibility to ensure that nuclear plant training programs meet high standards. The accreditation process is outlined and the members of the Board are listed in the enclosed brochure. As you can see, the Board includes eminent Americans with extensive experience in the training and education field. To date, the Board has accredited 68 programs at 16 utilities.

Although the industry approach has been implemented, modifications and improvements have been and are being made. The Nuclear Waste Policy Act of 1982 caused INPO and nuclear utilities to reexamine and strenghthen the industry approach to upgrading training and resulted in the Nuclear Regulatory Commission issuing its Policy Statement on Training and Qualification in 1984. This Policy Statement requires that utilities adopt a systematic approach to training and qualification and recognizes the industry accreditation process as an effective means of ensuring that utility training is performance-based. It also establishes specific NRC activities designed to independently monitor improvements in industry training programs. This Policy Statement was issued as a result of strengthened commitments by all utilities to achieve accreditation.

The development of your Nuclear Power Plant Personnel Training Act again highlighted the need for high quality training and the benefits of standardization and centralization. The re-examination of these benefits has resulted in our placing greater emphasis on the independence of the Accrediting Board. In recognition of this independence, we have changed its official name to the National Nuclear Accrediting Board.

The nuclear power industry has in place a good foundation for achieving the high quality training that is the goal of the proposed Training Act -- modern utility training facilities, INPO evaluation and assistance programs, utility commitment to upgrading training, and an independent National Nuclear Accrediting Board. I am aware that Dennis Wilkinson, my predecessor at INPO, and Gene McGrath, Executive Vice President of Consolidated Edison Company, met with you on May 8 and briefed you on industry training. I share Mr. Wilkinson's ideal of excellence in all phases of training in the industry and look forward to meeting with you in the future.

Sincerely,

Zack T. Pate
President

AMM:tb

Enclosures: INPO 1984 Annual Report: "Resources, Actions, Results"
"Training: A National Accomplishment"

INPO

Institute of
Nuclear Power
Operations

1100 Circle 75 Parkway
Suite 1500
Atlanta, Georgia 30339
Telephone 404 953-3600

August 19, 1985

The Honorable Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

Thank you for the opportunity to testify at the June 27, 1985 hearing of the Senate Environment and Public Works Subcommittee on Nuclear Regulation concerning nuclear industry training and the National Academy concept.

In followup to that testimony, and in response to your letter to me of July 9, 1985, my responses to your questions are attached.

Sincerely,

Zack T. Pate

Zack T. Pate
President

Attachment

AMM:tb

Dr. Zack T. Pate Responses to Questions from Senator Daniel Patrick Moynihan

1. **What are the differences between "standards," "criteria," and "benchmarks of excellence" as the Institute of Nuclear Power Operations (INPO) and the National Nuclear Accrediting Board (Board) use these terms to evaluate utility training programs?**

   There is no difference between the terms "standards" and "criteria" as used by INPO and the Accrediting Board. "Standards and criteria," "standards of excellence," and "criteria based on excellence" are sometimes used interchangeably.

   "Benchmarks of excellence" was a phrase that was used early in INPO's development to describe what INPO's purpose would be. This purpose, as stated in the September 1979 "Organizational Plan for the Institute of Nuclear Power Operations," was "... to establish industrywide benchmarks for excellence in nuclear operation and to conduct independent evaluations to assist utilities in meeting the benchmarks."

   The standards that are used as a basis for measuring the quality of a nuclear utility's training programs are officially called the "accreditation criteria." These criteria were established by INPO after significant industry input and review. They are published in the INPO document, The Accreditation of Training in the Nuclear Power Industry (INPO 85-002). They are used by INPO accreditation teams and by the National Nuclear Accrediting Board when evaluating utility training programs.

2. **What is meant by "performance-based" training or a "systems approach" to training? Do these terms suggest rote training? One nuclear engineer suggested to me a "trend toward rote training and a morass of paperwork," noting that "memorization of**

tens or hundreds of pages of special procedures, operating procedures, and emergency procedures cannot possibly lead to increased safety, but instead promotes automaton-like and inane responses." Do you agree with this assessment?

"Performance-based" training is a result of a "systems approach" (or "systematic approach") to training. The systems approach to training establishes a direct relationship between the job requirements and the training provided for people performing the job. The content, methods, and standards used for the training are based on the job performance requirements; thus the training is "performance-based." The systems approach to training can be implemented in several ways, but includes activities to accomplish the following:

- identify the training that should be provided for each job (based on analysis of job performance requirements and initial qualifications of trainees)
- design and develop training programs with explicit learning objectives and appropriate job-related content
- conduct training as designed
- ensure that trainees master the learning objectives before they begin working in their assigned job
- evaluate training effectiveness and use these results to maintain and improve training

Performance-based training programs are not limited to routine or repetitive jobs. They prepare the trainees to perform the job by developing knowledge and skills directly related to tasks required to be performed by job incumbents. After building fundamental trainee capabilities, performance-based training ties these capabilities together through demonstration and practice of task performance on the job or at a simulator. In the case of operator training, additional capabilities are developed by covering situations where the trainee must apply principles and technical information when analyzing new problems and diagnosing events. Thus, this training goes far beyond rote performance.

The availability and required use of many plant procedures creates the perception of automatic or rote response. However, this perception of the operator's job is not accurate. Performance-based training develops the trainee's ability to effectively use procedures by diagnosing events, selecting the correct procedures, using them as job aids, and recalling the reasons or limitations associated with procedural steps. As a result, performance-based training reduces the tendency toward procedure memorization and rote response.

3. **The Navy's Nuclear Power School course lasts six months and consists of 700 hours of classroom instruction. Compare the Navy's program of classroom instruction to the typical utility's.**

The Navy's basic nuclear power school courses are mostly classroom (academic) instruction without laboratories, but they are followed by several months of hands-on training at a nuclear plant prototype.

Based on the 1984 INPO Survey of Nuclear-Related Training Activity, the typical utility's initial training programs for operators (licensed and non-licensed) included 40 weeks in the classroom, four weeks at a simulator, and 23 weeks of on-the-job training for a total training period of 67 weeks or about 2600 hours. (A typical operator completes non-licensed operator training, serves as a non-licensed operator for several years, then is trained as a licensed reactor operator.) An additional 34 weeks of training is provided to senior licensed operator candidates. The industry's annual requalification training for licensed operators (reactor operators and senior reactor operators) averaged nine weeks of classroom and simulator training.

The New York Board of Regents recently evaluated the Navy's basic nuclear power school courses and recommended 33 semester hours of college credit towards an Associate of Science Degree. Typical courses were Mathematics, Physics I and II, Atomic Physics, Nuclear Physics, Chemistry, Reactor Technology, Heat Transfer, Fluids, and Nuclear Materials. As a comparison, several utilities that have operator training programs accredited by INPO also have had their programs evaluated by the New York Board of Regents for college credit recommendations. They have received recommendations for an average of 16.3 semester hours for the non-licensed operator programs and 22.5 semester hours for the licensed and senior licensed operator programs, for a total of 38.8 credit hours.

4. **Admiral H. G. Rickover commented, "We train our people in theory because you can never postulate every accident that might happen." Does the utility industry take the same approach?**

Yes, utilities generally take the same approach by providing training that will prepare operators to react properly to accidents, including those that may not have been postulated. In addition to receiving a sound foundation in fundamental science and engineering topics, operators are further prepared for accident situations by training covering the following areas:

- plant systems, equipment, and associated procedures
- transient and emergency prevention and mitigation
- accident diagnosis

- simulator training
- lessons learned from industrywide operating experience

5. **Please describe the specific commitments made by INPO, NUMARC, and the utility industry to the Nuclear Regulatory Commission (NRC) concerning training. INPO has received 141 utility self-evaluations to date, and the Board has accredited 68 individual programs at 16 utilities. INPO has promised to have 620 programs (covering all the different units in commercial operation at the end of 1984) "ready for accreditation" by the end of 1986. How can you do that?**

NUMARC presented to the NRC on behalf of the nuclear industry a commitment to have the 10 training programs at each of the nuclear sites with plants operating as of the end of 1984 ready for accreditation (final self-evaluation report submitted) by the end of 1986. There are 61 such sites. (An earlier count of 62 plant sites has been changed to 61; one plant was shifted to the group of plants beginning operation after 1984 because of delays in licensing.) Thus, the industry's commitment will be met if, by the end of 1986, INPO has received final self-evaluation reports covering 610 training programs at those 61 sites. Although we expect that all 61 utilities will complete their self-evaluations of the 610 programs by the end of 1986, accreditation team visits and Board reviews for initial acccreditation for all of the 610 programs will not be complete until 15 to 18 months later, due to the immense workload involved. The important point, however, is that all utilities with plants in operation by the end of 1984 will be training their personnel in fully implemented performance-based training programs by the end of 1986.

To meet this commitment, nuclear utilities are expending significant resources; they will also have to closely manage their efforts and assist each other in training program development. INPO is coordinating and monitoring the utilities' accreditation efforts, providing assistance to utilities preparing for accreditation by conducting assistance visits and seminars, and providing accreditation teams to evaluate the training programs for accreditation purposes. We have the resources to support these activities at the level necessary for the industry to meet its accreditation commitment.

6. **What does "ready for accreditation" mean? When ought we to be convinced that a utility is running an adequate program? When they design it? Start it? Submit it to INPO? When INPO says it is "ready for accreditation"? Or only when it is accredited? Until a utility's programs are accredited, can we assume its operators have been adequately trained? How would we know?**

When a utility believes its programs meet the published accreditation objectives and criteria and are "ready for accreditation," it provides to INPO a detailed, final self-evaluation report with descriptions of its training processes along with copies of procedures, reports, data, and sample training materials. We review these materials to determine if the programs are, in fact, "ready for accreditation." If so, we schedule a formal accreditation team visit. INPO may reject the report as not being acceptable as a "final" report and advise the utility as to what additional action must be taken to meet the objectives. Frequently, a small team visits the site to confirm the results of our review of the self-evaluation report.

In addition to the accreditation process, we provide assistance on site and at INPO, as well as conduct plant and corporate evaluations that measure training performance. Many excellent programs were in place before the INPO accreditation program began in 1982, and improvements in the quantity and quality of training are constantly being made. Accreditation requires that a training program be more than "adequate." Thus, many operator training programs are adequate, but have not yet been accredited. INPO helps to ensure that all training programs are adequate by performing evaluations that identify aspects of training programs needing improvement and by ensuring that those improvements are accomplished.

In summary, you can be confident that basically sound training is in place when a utility submits a final self-evaluation report to INPO that is acceptable to INPO. Formal accreditation then provides further assurance that the program fully meets all accreditation criteria and is up to the high standards expected by the Accrediting Board.

With respect to the "how would we know" part of the question, INPO would be pleased to brief the Subcommittee on accreditation progress at any time. In addition, INPO keeps the NRC apprised of accreditation progress.

7. **Describe the accreditation process and NRC involvement in the development and promulgation of INPO's accreditation programs. What portion of the information ultimately used by INPO and the accrediting board then becomes part of the public record?**

The accreditation process as described in the INPO document, The Accreditation of Training in the Nuclear Power Industry, consists of the following principal activities:

- Utility accreditation self-evaluation
  The utility measures its training system and programs against the INPO Accreditation Objectives and Criteria, makes necessary improvements, and prepares a self-evaluation report that will be used by the accreditation team.

- INPO accreditation team evaluation
  The accreditation team, consisting of INPO and utility personnel, visits training sites and evaluates how well the training programs meet the objectives and criteria. The team's recommendations are forwarded to the utility in an INPO report. The utility takes corrective action and responds in writing to each recommendation.

- National Nuclear Accrediting Board decision
  The final decision to award or defer accreditation is made based on the team's report, the utility's response, and the INPO staff recommendation. The utility's representatives are present at the Board meeting to describe the current status of the programs and answer questions.

- Maintaining Accreditation
  Accreditation is maintained by the utility submitting a status report at the end of two years. After four years, the acreditation process is repeated. INPO monitors the training throughout the four years.

The NRC's involvement in the accreditation process, as outlined in a Coordination Plan for NRC/INPO Training-Related Activities includes the following:

- Throughout the development and implementation of the accreditation process, INPO has provided periodic detailed briefings on accreditation to NRC management personnel. These meetings continue to be conducted approximately quarterly.

- INPO has provided the NRC with copies of the INPO manual, Principles of Training System Development, the INPO document, The Accreditation of Training in the Nuclear Power Industry, and other training-related INPO documents.

- The NRC recommends individuals who are not on the NRC staff to serve (with full voting privileges) on the National Nuclear Accrediting Board

- An NRC staff member may attend and observe Accrediting Board meetings with INPO staff and utility representatives.

- On request and with the concurrence of the utility, NRC staff members may observe INPO accreditation team site visits for the purpose of monitoring the accreditation process.

INPO is responsive to the public interest in that it includes representatives from outside the nuclear power industry on the Accrediting Board and the Advisory Council to the INPO Board of Directors. In fact, the charter for the Accrediting Board requires that a majority of the voting members at each decision-making board meeting be from outside the utility industry.

INPO makes the following publicly available:

- The Accreditation of Training in the Nuclear Power Industry, which includes the accreditation criteria and procedures

- the Principles of Training System Development manual

- the status of accredited plants and programs

- the names and affiliations of members of policy and decision-making bodies, including all members of the Accrediting Board

8. **What about the post-1984 plants? What are your timetables for their training programs?**

Training programs at plants that begin operation after 1984 are to be ready for accreditation within two years after fuel load. This requirement is promulgated in The Accreditation of Training in the Nuclear Power Industry (INPO 85-002) issued in January 1985.

9. **How do you plan to deal with those utilities least willing or able to upgrade their training programs? When and how will INPO determine that a utility is not acting in good faith? And then what? INPO promotes nuclear power. Is INPO likely to suspend the membership of a recalcitrant utility and cast a pall over the industry?**

There has been no indication from an INPO member utility of an unwillingness to meet accreditation criteria or the schedules described above. INPO personnel have been assigned as accreditation coordinators with responsibility for monitoring the accreditation progress of specific plants and training programs. These coordinators are in regular and frequent communication with their utility counterparts at the plants. They are also kept informed of the results of INPO plant evaluations, assistance visits, and other INPO/utility interactions. When or if a coordinator becomes aware of a utility having difficulty in upgrading a training program, INPO assistance is offered. In the unlikely situation that a utility is not acting in good faith, it will become apparent to the coordinator through the objective monitoring of progress. This would be brought to my attention as soon as it was identified.

INPO promotes excellence in operations of nuclear plants but does not promote nuclear power, per se. Our programs are designed to help ensure that plants are operated safely and reliably.

Although INPO is financially dependent on the industry as a whole, we have fully adequate independence from any one utility (or a few, since there are 55 utility members).

A special procedure, approved by the INPO Board of Directors, provides guidance in the event that a member utility is not responsive to our programs or is unwilling to take action to resolve a significant safety issue. The procedure calls for INPO and the utility management to work to resolve any issues in contention. Should resolution not be satisfactory, the procedure calls for specific interaction between the chief executive officer of the utility and the chief executive officer of INPO. Ultimately, INPO has authority to suspend the utility from membership if the utility continues to be unresponsive. INPO will not hesitate to use this authority if it becomes necessary.

10. **Admiral Rickover endorsed the idea of an industry organization such as INPO, but in a recent phone conversation, he said, "make it public." Can or should INPO share information with the NRC and the public? To what extent would such a course hinder INPO? What about the public's right to know? How can we be sure the accrediting board is doing its job if we do not have access to the information it uses to reach its conclusions?**

In order for many of INPO's programs to be effective, it is necessary to identify problems related to the nuclear stations operated by INPO members in detail. Experience shows that the details of such problems must be communicated in writing if corrective actions are to be effective. Experience also shows, however, that reports of such problems in the hands of persons or organizations not familiar with the entire process or program (e.g., the INPO evaluation programs, accreditation process, events analysis program, or certain assistance activities) can be misinterpreted and/or misused. When this occurs, the open exchange of information so necessary for the success of these INPO programs is hampered, and INPO's ability to bring about improvement in nuclear plant safety and reliability is undermined. When all detailed exchanges between INPO and its members are subjected to public scrutiny, the plane of reference moves away from the pursuit of excellence toward meeting minimum acceptable requirements. The Kemeny Commission found that a mindset of seeking to meet minimum requirements was a contributing factor to the TMI accident. Accordingly, certain INPO interactions, documents, and correspondence with or about member utilities are considered private between INPO and the member, or they are subject to a restricted or limited distribution.

The public has a right to know that the government is involved in ensuring that nuclear plants are being operated safely. The NRC can carry out this responsibility to the public, in part, by monitoring INPO activities related to nuclear power training. The public may need to know that a nuclear power plant has completed the accreditation process and how this was accomplished. INPO makes public the accreditation criteria and procedures, membership of the National Nuclear Accrediting Board, and the list of those plants that have achieved accreditation.

The NRC staff member who attends the National Nuclear Accrediting Board meetings as an observer can, on the day of the meeting, review the materials used by the board members in reaching a decision.

11. **Should reactor operators be required to have engineering degrees? Should the NRC require the examination and licensing of plant personnel other than candidates for the operator or senior operator's licenses? What about construction, maintenance, and repair personnel? What about utility managers?**

Although we recognize the need for engineering expertise on shift at nuclear plants, we do not believe that all reactor operators should be required to have engineering degrees for the following reasons:

- All licensed operators presently receive training that provides the knowledge and skills required for the position, including team training and diagnostic skills, through utility-conducted licensed operator training and qualification programs. These programs have been, or are being, significantly improved in order to achieve INPO accreditation.

- Based on comparisons of the skills and knowledges required by reactor operators identified by an industrywide job and task analysis and the content of several engineering curricula, no single engineering degree program provides the requisite knowledge and/or understanding of reactor theory and operation. Also, college curricula include numerous topics that are not applicable to the jobs of reactor operators.

- Requiring all reactor operators or senior operators to have degrees would have substantial adverse impact on the industry in the area of human resource management. It would be difficult, if not impossible, for utilities to acquire degreed operators in the numbers that will be needed in the coming years. It would eliminate from contention many potential new hires who have the intellectual ability and motor skills to become fine operators. It could also eliminate from the ranks of operators many highly experienced and capable operators who are proven performers.

- Since the Three Mile Island accident, significant improvements have been made that enable operators to perform well. These improvements include the following:
  - increased crew staffing
  - improved procedures
  - improved control room designs
  - improved simulator training and facilities
  - increased training resources and improved facilities
  - improved operator information systems

We do not believe that the NRC should require the examination and licensing of construction, maintenance, and repair personnel or utility managers for the following reasons:

- Licensing of these individuals would require the industry to implement license training programs designed to ensure that, at a given point in time and at some specified time interval, the graduates of the training process meet some minimum acceptable standard, focusing primarily on meeting regulations rather than the systematic approach to training that is embodied in the INPO-managed accreditation program.

- Every utility that owns, operates, or is constructing a nuclear power plant is responsible for establishing ongoing, comprehensive, and systematic training programs to develop highly qualified, well-trained personnel, not only for operators but for all of the 10 key positions involved in nuclear power operations. These 10 positions include, along with the operators, maintenance and repair personnel, chemistry and radiological protection technicians, and engineers.

- INPO has provided training program guidelines to the industry for their use in developing the aforementioned training programs. The training program guidelines were developed using a systematic approach to training; they were not designed to meet a minimum regulatory requirement.

- High standards for training nuclear power plant personnel have been set by INPO through the evaluation and accreditation objectives and criteria. Each utility has committed to meet these standards and to achieve and maintain accreditation of its training programs. This will ensure that the graduates of these training programs not only achieve a high level of academic excellence but also maintain and improve their job-related skills through regular participation in the continuing training that is part of a systematically developed training program.

- Training conducted to meet a regulatory license requirement would not achieve the high level of expertise presently being achieved by the training programs that have been developed through individual commitment to and personal pride in meeting or exceeding high standards of performance. As Dr. Forrest J. Remick stated in his June 27, 1985 testimony before the Senate Subcommittee on Nuclear Regulation, "...one could not have accomplished by the mandate of federal regulations what is being accomplished by individual commitment, personal pride, and by peer pressure and assistance."

12. **Characterize the professionalism and esprit d'corps of reactor operators and other plant operations personnel. Are reactor operators technicians or professionals?**

Reactor operators and other operations personnel in nuclear power plants exhibit a strong commitment to safe nuclear power operations. They do not consider their work to be just a job. They are dedicated people who are confident that their training and experience have prepared them to fulfill their responsibilities. They are "team members" who are proud of their plants and their utilities.

There are some points of dissatisfaction, primarily due to the uncertainty about some aspects of their future, namely the possibility of a degree requirement and the requirement to annually complete federally administered requalification examinations in order to maintain their status as licensed operators. They are not opposed to requalification training or recertification by their utility, but they view federal re-licensing as an unfair burden and a continued threat to their livelihood. They are quick to point out that other professionals do not have to re-earn their license every year (e.g., professional engineers, lawyers, doctors, architects, accountants, pilots).

A professional is a person who engages in an activity requiring specialized knowledge and intensive preparation. Operators consider themselves to be professionals who have been carefully selected and trained to safely operate nuclear power plants. We concur completely and are doing all we can to support and enhance the professionalism of the operator community.

13. **Operators at Three Mile Island acknowledged in 1979 that plant conditions were beyond the scope of their training. When will we have the programs in place and the information necessary to determine if that is possible today?**

Operator training programs were revised extensively (industry-wide) after the Three Mile Island accident to include accident analysis under abnormal plant conditions. Although it may never be possible to postulate every accident that might happen, performance-based training programs are now in place to prepare operators to respond to abnormal plant conditions. Many abnormal plant events are covered directly in the training program. The ability to apply principles and technical information to analyze new problems and diagnose new events is also stressed. This ability, combined with training in fundamental theory, component, and system information, prepares operators to handle unforeseen situations. I should point out, however, that no amount of training, no matter how good, can prevent operators from making mistakes.

14. **If INPO and the utilities are convinced of the soundness of their training programs and the safety of their operations, would you waive Price-Anderson liability limits for accidents attributable to human error?**

The Price-Anderson matter is complex and is outside the purview of INPO, INPO programs, and the areas of expertise of my staff. Therefore, we feel it would be inappropriate for INPO to comment.

15. **The public perception of the safety of nuclear power is not good. Have recent industry efforts through INPO had an effect on public perception? Would more NRC or congressional oversight of training and INPO help? Do you think that some sort of federal training academy operated in conjunction with INPO and subject to NRC and congressional oversight might enhance the public acceptance of nuclear power?**

All of INPO's programs are aimed at assisting its member utilities in assuring safe and reliable nuclear plant operation. A sustained record of safe and reliable operation, along with continued progress in key plant performance parameters, as discussed in my June 27 testimony, provide a basis for improved public perception. We believe INPO's role should be limited to assisting utilities in achieving these ends. INPO should not expand its role to promote nuclear power to the public because such action could erode our credibility and our posture as an independent organization dedicated first and foremost to nuclear safety. Therefore, we have maintained this philosophy and this approach within our organization since its founding.

Congressional recognition and support of INPO's work is important to INPO's continued success. Recognition by the Senate Environment and Public Works Subcommittee on Nuclear Regulation of the INPO-managed accreditation program and the National Nuclear Accrediting Board are key areas where Congressional support is needed. We will be pleased to work with the staff and the Subcommittee to enhance or modify our efforts to strengthen industry training. We also will fully support and cooperate in the development of any initiative by the Congress or the Subcommittee to establish programs that are complementary to our work. We do believe, however, that our industrywide nuclear accreditation program, along with the National Nuclear Accrediting Board, embodies all the elements of a National Nuclear Academy for the industry.

TESTIMONY
TO
SUBCOMMITTEE ON NUCLEAR REGULATION
UNITED STATES SENATE

BY

DR. FORREST J. REMICK
ASSOCIATE VICE PRESIDENT FOR RESEARCH
THE PENNSYLVANIA STATE UNIVERSITY
AND
MEMBER
NATIONAL NUCLEAR ACCREDITING BOARD

Good morning! My name is Forrest J. Remick. I am Associate Vice President for Research at the Pennsylvania State University, where I also serve as a Professor of Nuclear Engineering.

I come before you this morning as a member of the National Nuclear Accrediting Board. However, before providing my remarks, I wish to briefly describe my background and experience.

My involvement in the nuclear profession goes back 30 years.

I received a Reactor Operator's License almost 29 years ago. I received the fourth Senior Reactor Operator's License issued in the United States and served 6 years as director of the second nuclear reactor licensed in the United States, a non-power reactor at Pennsylvania State University. Beginning in 1956, I developed nuclear laboratory and other courses for the training of operators of domestic and foreign research and power reactors.

For 2 years I served as Chief of the Training Section of the Department of Technical Assistance of the International Atomic Energy Agency located in Vienna, Austria.

For 14 years I served as a consultant reactor operator licensing examiner for both the AEC and the NRC, primarily for boiling water reactors. As a consultant I have conducted quality assurance audits of control room operation at power reactors.

REACTOR OPERATIONS AND THE TRAINING OF NUCLEAR FACILITY PERSONNEL HAVE BEEN AN IMPORTANT PART OF MY PROFESSIONAL LIFE.

IN ADDITION TO BEING ON THE NATIONAL NUCLEAR ACCREDITING BOARD AS A MEMBER NOMINATED BY THE NRC, I ALSO

o SERVED TEN YEARS AS AN ADMINISTRATIVE JUDGE ON THE ATOMIC SAFETY AND LICENSING BOARD (ASLB) FOR THE AEC AND THE NRC,

o SERVED AS POLICY CHIEF TO THE NRC COMMISSIONERS FROM 1981-1982, AND

o AM A CURRENT MEMBER OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS) OF THE NRC.

DURING THE PAST YEAR I HAVE HAD THE OPPORTUNITY TO PARTICIPATE IN THREE FORMAL TECHNICAL INFORMATION EXCHANGE MEETINGS IN WEST GERMANY AND IN JAPAN. TWO DAYS AGO I RETURNED FROM PARTICIPATING IN ONE OF THESE TECHNICAL EXCHANGE MEETINGS IN JAPAN. IT IS FROM THIS BROAD PERSPECTIVE THAT I WOULD LIKE MY REMARKS TO BE RECEIVED THIS MORNING.

I HAVE NOT HESITATED TO BE A CRITIC OF REACTOR OPERATIONS AND TRAINING. TEN YEARS AGO I WAS INVITED TO PROVIDE THE KEYNOTE ADDRESS AT THE NATIONAL SYMPOSIUM ON TRAINING OF NUCLEAR FACILITY PERSONNEL. I ENTITLED MY ADDRESS, "TRAINING OF NUCLEAR FACILITY PERSONNEL, BOON OR BOONDOGGLE?" IN THAT TALK I WAS QUITE

CRITICAL OF A NUMBER OF THINGS. I POINTED FINGERS AT THE INDUSTRY, AT THE AEC, AT UNIVERSITIES, AT NUCLEAR TRAINERS, ET CETERA.

ONE THING THAT I WAS PARTICULARLY CRITICAL OF WAS THE FACT THAT THE TRAINING STAFF AT MANY UTILITIES AT THAT TIME CONSISTED PRIMARILY OF ONE PERSON, CALLED THE TRAINING COORDINATOR. UNFORTUNATELY, THAT PERSON WAS NOT ALWAYS SELECTED BECAUSE HE KNEW MUCH ABOUT TRAINING, NOR BECAUSE HE NECESSARILY KNEW A LOT ABOUT REACTOR OPERATIONS; ALTHOUGH IN MOST CASES HE WAS LICENSED. MORE THAN LIKELY, THE INDIVIDUAL WAS SELECTED BECAUSE HE WAS THE PERSON AVAILABLE, AND NOT NEEDED FOR OTHER DUTIES.

THE SAD PART ABOUT IT WAS THAT MANY UTILITIES EXPECTED THIS ONE LONE INDIVIDUAL TO CONDUCT THE NEEDED TRAINING; MANY TIMES THAT PERSON DIDN'T REALIZE THAT IT WAS IMPOSSIBLE FOR HIM TO DO IT BY HIMSELF.

IN THAT TALK (AND ON MANY OCCASIONS SINCE THEN) I WAS CRITICAL OF THE FACT THAT REACTOR OPERATION WAS NOT TREATED AS A PROFESSION, AND THAT REACTOR OPERATORS WERE NOT TREATED AS PROFESSIONALS. I WAS CRITICAL ABOUT THE LACK OF PROPER TOOLS BEING MADE AVAILABLE FOR OPERATORS TO USE, PARTICULARLY IN A TIME OF CRISIS. FURTHER, I COMPLAINED THAT THERE WERE VARIOUS HUMAN ENGINEERING CONSIDERATIONS ABSENT IN THE CONTROL ROOM AND IN THE PLANT.

AT THAT NATIONAL MEETING TEN YEARS AGO, THERE WERE ABOUT 125 PEOPLE IN ATTENDANCE; MANY WERE FROM UNIVERSITIES, NATIONAL LABORATORIES AND CONSULTING ORGANIZATIONS.

RECENTLY, I WAS INVITED TO PARTICIPATE AS CHAIRMAN OF THE OPENING SESSION AT THE SIXTH NATIONAL SYMPOSIUM ON THE TRAINING OF NUCLEAR FACILITY PERSONNEL HELD IN NASHVILLE. AT THAT SYMPOSIUM, OVER 500 PEOPLE WERE IN ATTENDANCE, MOSTLY PROFESSIONAL UTILITY TRAINING PERSONNEL.

WHEN ACCREDITATION OF THE NUCLEAR TRAINING PROGRAMS WAS FIRST SUGGESTED, FOLLOWING THE ACCIDENT AT THREE MILE ISLAND, I WAS NOT A STRONG PROPONENT OF THE CONCEPT. AT THAT TIME I COULD NOT SEE HOW ACCREDITATION ITSELF COULD MAKE THE MAJOR IMPACT ON TRAINING PROGRAMS THAT I THOUGHT WAS NECESSARY. I WAS NOT AGAINST IT, BUT I WAS NOT A PROPONENT.

I BELIEVE THAT THE REASON I WAS APPOINTED TO THE NATIONAL NUCLEAR ACCREDITING BOARD IS BECAUSE SOME OF THE NRC STAFF AND SEVERAL OF THE NRC COMMISSIONERS WERE AWARE OF MY OPERATIONS AND TRAINING BACKGROUND AND INTERESTS, AS WELL AS MY EFFORTS TO MAKE CHANGES IN OPERATOR LICENSING WHILE SERVING AS POLICY CHIEF TO THE NRC COMMISSIONERS.

THE POINT THAT I WISH TO CONVEY THIS MORNING IS THAT A DRAMATIC CHANGE IN THE TRAINING OF NUCLEAR FACILITY PERSONNEL HAS TAKEN PLACE IN THE LAST SEVERAL YEARS.

For example, there has been a tremendous increase in the personnel resources that are being made available for training. No longer is there a sole training coordinator, assisted by some part-time help or consultants. Typically, there are 15 to 40 or more members of the training staff depending on the number of units at the site. Instructors are supported by curriculum developers, instructional specialists, librarians, etc. There are now instructors for mechanical, electrical and instrumentation and control maintenance. There are also training programs for technical and management personnel.

Further, there are extremely impressive changes that have taken place in facility resources. There are numerous and spacious classrooms, ample offices, libraries, simulators, many types of instructional services, etc. As a university professor, I cannot conceal my envy of these highly impressive facilities.

Of particular note are the facilities that are being developed for the training of mechanical maintenance, electrical maintenance and instrumentation and control technicians. It is my opinion that the formalization of these craft training programs will result in dramatic improvements in plant reliability over the coming years; an area where we have considerable room for improvement. The Japanese have learned that improved reliability results in enhanced public acceptability and in cost reductions.

AS A RESULT OF MY INVOLVEMENT IN THE ACCREDITING PROCESS, I HAVE BECOME A STRONG ADVOCATE FOR THE SYSTEMATIC APPROACH TO TRAINING AND TO TRAINING THAT IS PERFORMANCE-BASED. I WISH I HAD KNOWN MORE ABOUT IT 25 OR 30 YEARS AGO. I BELIEVE IT WOULD HAVE MADE ME A MUCH BETTER UNIVERSITY PROFESSOR.

IN THE PAST YEAR OR SO, I HAVE BEEN INVITED ON ABOUT A HALF DOZEN OCCASIONS TO TALK AT NATIONAL MEETINGS ON THE NUCLEAR ACCREDITATION PROCESS. AT THOSE MEETINGS, I STRESSED THE IMPORTANCE OF QUALITY IN TRAINING, IF WE ARE TO ACHIEVE EXCELLENCE IN PLANT OPERATIONS. FURTHER, I DISCUSSED HOW ACCREDITATION CAN BE USED IN ACHIEVING QUALITY IN TRAINING PROGRAMS.

ON THESE OCCASIONS, I HAVE TALKED TO PLANT PERSONNEL, TO TRAINERS, TO PLANT MANAGERS, TO NUCLEAR VICE PRESIDENTS AND TO CHIEF EXECUTIVE OFFICERS. IN THESE INTERACTIONS, I HAVE BEEN SINCERELY IMPRESSED BY THE COMMITMENTS THAT ARE BEING MADE AND IN THE RESOURCES THAT ARE BEING MADE AVAILABLE TO ACCOMPLISH THESE IMPROVEMENTS IN TRAINING.

OF SPECIAL IMPORTANCE, PLANT PERSONNEL AND TRAINING PERSONNEL ARE INCREASINGLY PROUD OF WHAT THEY ARE ACCOMPLISHING.

IN THE LAST THREE TO FOUR MONTHS, I HAVE HAD THREE INVITATIONS FROM UTILITY PERSONNEL WHO REMEMBER MY "BOON OR

BOONDOGGLE" TALK. THEY INVITED ME TO COME AND SEE THEIR FACILITIES AND THEIR PROGRAMS. THEY ARE EXTREMELY PROUD OF WHAT THEY ARE DOING AND WHAT THEY ARE ACCOMPLISHING. ON MY PART, I AM EXTREMELY PROUD TO BE PROFESSIONALLY INVOLVED IN THE PROCESS THAT I BELIEVE IS CONTRIBUTING TO THESE IMPROVEMENTS.

RECENTLY, MEMBERS OF THE NATIONAL NUCLEAR ACCREDITING BOARD MET WITH THE NRC COMMISSIONERS. AT THAT TIME, I INDICATED THAT I AM A SUPPORTER OF THE NRC PROCESS. I HAVE BEEN A PART OF THAT PROCESS AND CONTINUE TO BE A PART OF IT. HOWEVER, I INDICATED THAT IT IS MY SINCERE VIEW THAT ONE COULD NOT HAVE ACCOMPLISHED BY THE MANDATE OF FEDERAL REGULATIONS WHAT IS BEING ACCOMPLISHED BY INDIVIDUAL COMMITMENT, PERSONAL PRIDE, AND BY PEER PRESSURE AND ASSISTANCE.

IN MY TWO TECHNICAL INFORMATION EXCHANGE VISITS TO JAPAN, JAPANESE GOVERNMENT, INDUSTRY AND UTILITY PERSONNEL STRESSED THAT THEY OPERATE AT A MUCH HIGHER LEVEL OF COOPERATION AND MUTUAL TRUST THAN IS THE CASE IN THE UNITED STATES. IN MY VIEW, THEIR PHENOMENAL SUCCESS IN IMPROVING PLANT RELIABILITY IS PROOF THAT IMPROVEMENTS CAN BE MADE ABSENT ADVERSARIAL RELATIONSHIPS.

I INDICATED TO THEM THAT THE NRC'S DECISION TO ALLOW UTILITIES TO DEMONSTRATE WHAT THEY CAN ACCOMPLISH IN THE TRAINING AREA WITHOUT FURTHER REGULATORY REQUIREMENTS IS PRECEDENT SETTING AND HOPEFULLY MIGHT BE THE BEGINNING OF A MORE COOPERATIVE APPROACH FOR THE FUTURE. I WOULD URGE THAT CONGRESS SUPPORT THE NRC AND THE INDUSTRY IN THESE COOPERATIVE EFFORTS.

4 September 1985

Honorable Alan K. Simpson, Chairman
Subcommittee on Nuclear Regulation
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510

Dear Senator Simpson:

On 27 June 1985 I participated in the hearings conducted by your subcommittee on legislative proposals to improve the education and training of personnel responsible for commercial nuclear power plants.

Subsequent to that hearing, I received a set of follow-up questions. The questions arrived by mail without a covering letter; therefore, I am assuming that my response should be addressed to you, as Chairman of the Subcommittee.

I have taken some liberty with the questions and have combined them in a manner more convenient for preparing a response. My response is contained in Attachment 1; a copy of the questions can be seen in Attachment 2.

Thank you for this opportunity to provide further response and for your interest in the important matter of training of nuclear facility personnel.

Sincerely,

Forrest J. Remick
305 East Hamilton Avenue
State College, Pennsylvania 16801

FJR:gc

Attachments

ATTACHMENT 1
RESPONSES TO HEARING QUESTIONS FOR DR. REMICK

Systematic, Performance-Based Training

Performance-based training is training that provides the knowledge and skills required to perform the tasks of the jobs carried out by individuals holding various positions in a nuclear power plant (e.g., such positions as reactor operator, mechanical maintenance technician, health physicist, etc.).

A detailed analysis of the jobs performed by a number of individuals who fill a specific position is conducted in order to develop a list of the tasks that one must perform to carry out that job. A thorough analysis of each task is undertaken then to determine the knowledge and skills one should possess to carry out each task successfully.

In a systematic training program, one takes the list of knowledge and skills required to perform the tasks of the various jobs of a specific position and systematically designs, develops and implements training which will enable the trainee to acquire such knowledge and skill. Such training may include formal classroom lectures, self-study, video cassettes, films, simulators, on-the-job training, etc., as deemed most appropriate for learning the necessary knowledge or skills. Learning objectives, lesson plans and examinations are all systematically designed and used to assure that the necessary knowledge and skills are being taught and are being acquired. Further, continuous evaluation of the program is made using examinations, input from trainees (during and after their training) and input from supervisors of former trainees (after returning to the workplace). In systematic training, this continuous feedback is used to close the loop in order to assure that the necessary knowledge and skills to carry out the tasks are being acquired.

Thus, a systematic, performance-based training program is one which is based on a logical, systematic, closed-loop system of analysis, design, development, implementation and evaluation to assure that trainees acquire the knowledges and the skills necessary to enable them to satisfactorily and safely perform the various tasks of the multiple jobs they must perform in their position in a nuclear power plant.

Education Versus Training

Systematic, performance-based training does not imply rote training anymore than studying history implies mere rote learning of dates. The term systematic implies that a thorough, closed loop program has been developed.

This is to assure that major holes do not exist in an individual's knowledge or skills due to each instructor teaching only what he considers important based on his experience or interest, and due to the fact that nobody has assured that all necessary knowledge and skills are being taught and learned.

Some individuals in the field do think that operators need only to be able to follow specific procedures and that procedures can be written for every eventuality. I disagree with such a philosophy; however, I must admit that one of our major national laboratories with a fine nuclear safety record espouses such a philosophy. I strongly believe that reactor operators should be encouraged to question, to ask why and to think. I think that they should be stimulated and encouraged to continue to learn beyond that required to carry out the tasks of their position, to work for degrees and advanced degrees and to cross-train to fill other positions. I think such further education and training makes better operators, better employees and encourages professionalism. However, this does not detract from the fact that training programs developed to teach necessary knowledge and skills should be systematic and performance-based. Under either philosophy, training to carry out the tasks of one's job should be systematic and performance-based.

Engineering Degrees for Reactor Operators

In my experience with training, working with, examining and auditing reactor operations personnel, I have met many good operators that do not have degrees; also, I have met some poor operators with degrees. Further, not all of the knowledge and skills necessary to be an operator are taught in engineering courses. Thus, I would not mandate the degree requirement for all operators. However, if I were to staff a nuclear power plant, I would want a number of my operators to have engineering degrees. I would select operators who wished to continue to learn, and I would encourage them to continue to learn and to train for new skills. I strongly believe that some engineers enjoy the challenge of professional plant operations. Therefore, I think that with proper stimulation, encouragement, incentives, leadership and professionalism, one can develop an elite operations group of high esprit de corps, which would include a number of degreed personnel.

Training of Utility Managers

Your question about utility managers is not specific enough for me to answer. There are a wide range of managers from supervisory plant personnel up to the utility CEO. The question does not identify which managers. However, addressing your question, in general, I would like to see more senior nuclear utility personnel who have risen up through the operations ranks in order that there would be more of them with plant operation experience. INPO does offer workshops for training managers, maintenance managers, plant managers, CEOs, etc. I think that more of these workshops, seminars, etc., could be highly useful, especially if they included some for a wider variety of management positions. I think it would be appropriate if some of these were sponsored by the government through INPO, NRC, DOE, universities, etc., as appropriate. Such government support would demonstrate positive interest and assistance.

INPO's Enforcement Power

I believe that INPO currently has considerable clout (a more fitting term than enforcement power in this case) with nuclear utilities. This clout results from the considerable CEO peer pressure that INPO can bring to bear in specific cases. The ability of INPO to stimulate this peer pressure of nuclear utilities is an impressive tool not available to any other agency or institution. In addition, the ultimate authority of INPO to suspend a utility from membership in INPO, if a utility is unresponsive to recommendations for improvement, represents powerful clout in my view.

Admittedly, the question of how effective INPO will be over a long period of time in getting and maintaining any "weak sisters" in line is yet to be demonstrated. However, this does not indicate that Congressional action is called for. I believe that INPO has the ability, the authority, and the determination to keep and bring utilities in line with their stated goals in establishing INPO. In fact, I think the tools and respect that INPO possesses is far more effective than that of a regulatory agency which has the authority to issue fines.

Professionalism and Esprit de Corps

Thank you for asking the question of how we can increase professionalism and esprit de corps of reactor operators and plant operations personnel. You have touched upon a matter for which "I have lecture--will travel."

In answering this question, I wish to provide you with a direct quote from a presentation I made at INPO's 1983 CEO Workshop on Management Involvement during which I expressed some of my views on professionalism and esprit de corps. I believe they respond directly to your question. The quote is as follows:

I said earlier that the pursuit and attainment of excellence in nuclear power plant operations is strongly dependent on the quality of your personnel and the quality of their training. Let me be more specific by saying that your only chance for success in attaining quality and excellence in nuclear power plant operations is to instill a sense of professionalism in your personnel and in the conduct of your operations.

In 1975, I was invited to present the keynote address at the Second Symposium on the Training of Nuclear Facility Personnel in Gatlinburg, Tennessee. The title of my talk was "Training of Nuclear Facility Personnel: Boon or Boondoggle?" A number of attendees collared me after my presentation and said, "Oh, if only our vice president for operations or our CEO had been here to hear your paper." Much of what I said then is still applicable today.

You are fortunate that there is not time today for me to repeat many of the points in that paper. However, I would like to quote from a part of the concluding observations. I remind you that this was four years before TMI-2.

> In conclusion, I would like to return to the title of this paper, "Training of Nuclear Facility Personnel: Boon or Boondoggle?" So that there is no misunderstanding, it is my contention that the training and licensing of reactor operators, is both boon and boondoggle. Although I know that some disagree with me, there is no question in my mind that without the licensing requirements that make training necessary, the general standards and qualifications of reactor operating personnel would not be as good as they are today. At the same time, I submit that sometimes this same training appears to be a boondoggle. I do not direct this censure at the concept of licensing and the requisite training and retraining. However, I do direct it to those who do not utilize it to its fullest potential for developing an elite, professional operating team of high esprit de corps. I have met both young and old trainees who had transferred from fossil-fueled plants who were extremely enthusiastic about the change because of the challenge that was before them in learning a new technology and who were enthusiastic about the amount that they had learned from their training. I consider it a boondoggle if the inspiration, leadership, or tools are not provided to capitalize on this interest, potential, and opportunity.
>
> I firmly believe that the magnitude of the capital investment and the safety of the general public warrant and necessitate highly trained personnel to operate our nuclear plants. Good training opportunities and the encouragement and rewards of professionalism attract better personnel. In turn, better personnel with improved training will lead to better and safer operation, which will yield increased reliability and plant capacity factors.

I believe that your pursuit of excellence in plant operations will not be realized without professionalism in operations.

I have been gently pushing this theme when provided an opportunity (such as today). I am delighted to find that Pat McDonald and I are on the same wave length.

In February 1981, I wrote to Red Thomas, Ken Strahm's predecessor at INPO, and provided a number of suggestions of methods to improve esprit de corps and professionalism in plant operations. Several of the points made then that relate to the discussion today are as follows:

- "I do not believe there will be a high level of professionalism and esprit de corps in reactor operations until reactor licensees decide to treat reactor operations as a profession and reactor operations personnel as professionals. I believe that there is too much of a view that if reactor operations personnel are kept professionally and intellectually "barefoot and pregnant," they will be happy to stay at the plant. The prevalent philosophy seems to be that if one hires individuals with intellectual drive and ambition, that they will not spend a lifetime as a reactor operator. Apparently overlooked is the fact that a high degree of professionalism and esprit de corps in operations can by itself cause people to be attracted and to remain in the profession. Quality reactor operations and the opportunity for continued learning can continue to provide professional challenges which can lead to retention of personnel. I believe if operations were approached more professionally, there would be much to keep bright individuals interested in operations."
- "Professionalism must start with professionalism at the upper levels of plant management."
- "Management should make it explicitly clear that they want, support and expect professionalism in plant operations."
- "Promotions, salary increases, etc., should be based on professional merit and not on seniority or purely in response to inflationary increases."

- "Management should go out of its way to officially and openly recognize the importance of professional plant operations and the eliteness of licensed personnel."
- "Management should officially recognize individuals when they initially receive their RO or SRO license or are promoted to shift foreman or supervisor. Management should openly acknowledge the effort expended in requalification."
- "Management could bestow special fringe benefits to licensed personnel to recognize their importance."
- "Personnel should be encouraged to qualify for other duties. For example, encourage reactor operators to qualify in instrument maintenance and vice versa. Recognize this qualification publicly and reward with merit increases."
- "The quality and appearance of shift foreman and shift supervisor offices should be made more professional."
- "Operations personnel should be encouraged to continue their education and training. This should include continued formal education as well as in-plant training in health physics, instrumentation, supervisory or management training, oral and written communications, etc."
- "I think that INPO is in a unique position to establish improved standards of professionalism and to push for their implementation. If not already being done, INPO should develop standards of professionalism. INPO Evaluation and Assistance teams should use these criteria during their evaluation visits. INPO should utilize their CEO seminars to stress the need for professionalism in plant operations. No other institution (except the NRC to a limited extent) is so uniquely empowered to both routinely visit all nuclear power plants and to be in a position to influence utility CEOs."

Those were some of my views on professionalism two and a half years ago, which I still strongly espouse.

As you have deduced, I'm trying to help INPO utilize this CEO Workshop to stress the need for professionalism.

In my remaining time, let me summarize my thoughts as follows:

- There is still much to be desired in the quality of operations in nuclear power plants.
- You are to be applauded for your goal of pursuing quality and excellence in nuclear plant operations through the establishment and support of INPO.
- To attain excellence, management must be involved, and you must manage for excellence--not just to meet regulatory requirements.
- The accreditation process provides you with a unique opportunity for management involvement and to demonstrate that you intend to manage for excellence.
- INPO's role is to assist you in managing for excellence.
- Attainment of excellence in nuclear plant operations is strongly dependent on the quality of your personnel and on the quality of their training.
- Excellence will be realized only if plant operations is treated as a profession and only if plant personnel are treated as individuals.
- Professionalism and the pursuit of excellence must come from the top.
- The accreditation process provides you with an opportunity to instill a sense of professionalism and quality in your training programs and thus, into your plant operations.
- In conclusion, through management involvement, managing for excellence, using the accreditation process as a management tool and instilling a sense of professionalism in your personnel and in plant operations, you can be successful in attaining the goal you set when you established INPO--that is, the attainment of quality and excellence in nuclear power plant operations. --- (End of quote)

ATTACHMENT 2

HEARING QUESTIONS FOR DR. REMICK

You advocate a "systematic, performance-based" approach to training. What do these terms mean? Do they imply rote training? Does a systematic, performance-based approach to training impart more than operating procedures to the trainee? Admiral H.G. Rickover commented, "We train our people in theory because you can never postulate every accident that might happen." Are nuclear utility training programs similarly oriented?

One nuclear engineer described to me an instance in which he trained power plant personnel and discovered that trainees (with extensive simulator experience) knew what to expect from a given "manipulation," but did not understand "what was happening to give that response." Doesn't this highlight the need for more theoretical education? Do we want reactor operators and other plant personnel merely to follow procedures, or to think? (If we want them to follow procedures, could such procedures be modified into a computer program and performed by a machine?)

Should reactor operators have engineering degrees?

Should utility managers have greater technical expertise? Should they be trained?

Do you think the Institute of Nuclear Power Operations (INPO) has sufficient enforcement power to deal with the utilities least willing or able to upgrade their training programs? Should INPO make public the information it uncovers concerning the nature and extent of deficiencies in utility training programs? Should the Nuclear Regulatory Commission have a greater say in promulgating accreditation standards or greater oversight of the National Nuclear Accrediting Board?

How can we increase the professionalism and esprit d'corps of reactor operators and plant operations personnel?

Testimony

to

Subcommittee on Nuclear Regulation

United States Senate

by

John E. Carroll
Vice President
Training (Retired)
United Airlines

on

June 27, 1985

I'm Ed Carroll, and I retired in 1982 after 36 years with United Airlines. At the time of my retirement, I was a qualified 747 captain and held the position of Vice President of Flight Standards and Training and had held that position for the last five years of my activity with United.

In addition, my background included 20 years of participation between the active and the military reserve in the Air Force, and the majority of that particular time was spent in training and qualification activities. The final assignment I had was director of training and operations for the unit to which I was assigned.

I was approached by INPO in late 1982, just subsequent to my retirement from United Airlines, and asked if I would participate as a member of the National Nuclear Accrediting Board as a representative from a non-nuclear industrial training organization. In spite of my background and training, I accepted with some hesitancy, primarily because of my lack of awareness and knowledge of the nuclear industry itself.

Those fears were allayed, however, by my participation early in 1983 with an INPO accreditation team to a nuclear plant to evaluate training programs. I immediately became aware of the similarities between the nuclear utility industry and the airline industry in the approach to training and the content of training.

Both train their personnel with a systematic, job-performance-based approach. Both are concerned with the eventual licensing of people, whether it be to fly a commercial aircraft or to operate a nuclear power plant.

One of the primary things I recognized was that both industries use simulators as a basis for both initial and requalification training. In addition, the need to work together and to effectively accomplish the task is inherent in both disciplines, whether it is in the cockpit or the control room.

So, those recognitions allayed some of my concerns. However, again, on a personal basis, I did not want to be looked upon as a rubberstamp for these programs just because I had a lack of background or awareness in a particular industry. So, since I recognized I would be dependent upon information that would be brought to me, I wanted to be sure that information was reliable and thorough.

By accompanying an INPO accreditation team in the field, I was able to recognize that this was the case. The process was thorough; the INPO team was objective in its approach. The organization and management of the utility training programs were based upon what needed to be done to ensure professionally trained personnel. The development, selection and qualifications of the staff were addressed in the same way in which I like to see it done in the aviation industry. The support given to the process of the training facilities and material and equipment are conducive to ensuring proper training programs.

I was also very impressed with the feedback process I observed, the process that would assure that the product going into the control room -- the operator -- would be qualified and effective. The supervisors provide feedback to the training group on changes that should be implemented to assure even better products in the future. Further, the individual trainees are able to assess their capability to do the job and provide feedback on the effectiveness of the training program itself.

The final thing that helped me become more confident in the material that I was going to be given to assess and determine whether I would vote for accreditation, came from the recognition of the meetings that the INPO team held on each evening after their intense eight to ten-hour day of looking into all of these areas. At this time, they reviewed their concerns and reprioritized their activities for the next day to know the areas they should address further.

This Accreditation process is a unique process -- and I think it is one that is very, very beneficial and would be beneficial even in the aviation industry.

As a member of the accrediting board, participation in these team visits has been very beneficial. Many of the board members observe one or more visits a year. This gives the board the opportunity, during the deliberations on accreditation for a particular utility, to have the first-hand recognition and some awareness of what should be delved into in even greater depth.

Even with my background in training in the military and aviator communities, I have been very impressed with the thoroughness and professionalism of the approach to training in the nuclear power industry. I am confident that professional standards are being applied. I attribute this, in part, to INPO, but also to the utilities' commitment to these high standards of excellence.

RESPONSES FROM JOHN E. CARROLL

7662 Davis Peak
Littleton, CO 80127
August 15, 1985

United States Senate
Washington, D. C.

Dear Senator Moynihan,

I have just returned from a vacation trip which has delayed my response to your letter of July 9. I trust this has not inconvenienced you.

It was my privilege to appear before the Senate Environment and Public Works Sub-committee on Nuclear Regulation. I hope my testimony and answers to the questions you raised in your letter will prove of assistance as you fulfill your responsibility in assuring the quality of training in the nuclear industry.

Your questions and my opinions follow:

1. Please compare nuclear utility and airline industry training programs.

The nuclear industry has, in large measure, patterned its training after the airline approach. They both take a Systems Approach to training, make extensive use of simulators, use the latest technology, have well-qualified instructors, secure testing vehicles and a comprehensive feedback system. The comparison is valid, however, only when an established major airline program, such as United's, is used. If those of the smaller or newer carriers were to be examined, the utilities would be far superior.

I don't believe this would have been true prior to the INPO process. Training budgets have increased dramatically since the establishment of the accreditation program and the need to comply with the standards that have been set. It is these standards, the job and task analyses that have been completed, the use of peer evaluators and periodic evaluations that set the nuclear training programs apart - even when compared to a major airline.

Airline programs must comply with the broad requirements set down by the FAA. In general, they can meet the regulations using a multitude of approaches to training and they are responsible to a Principal Operations Inspector for continuing compliance. Even the major airlines, using the same equipment, will however differ on how to train or check their crews. There is also no process whereby representatives from an industry group, such as the Air Transport Association, or another airline can assess the efficacy of a program.

My experience leads me to the conclusion that when measured against the airline industry, the nuclear utility training programs are more than comparable. The airlines could in fact do well to adopt some of the approaches taken by the utility programs.

2. Pilots tend to be better educated, trained and paid than reactor operators. Pilots are professionals whereas reactor operators tend to be treated as technicians. Should we allow such a distinction? How can we make commercial nuclear power plant personnel more like commercial pilots?

Pilots do tend to be better educated today, but in the future, I believe this will be true to a lesser degree. In the past, the majority of the pilots came from the military and their entrance requirements were demanding. With a growing need and fewer military candidates, applicants will increasingly come from the private sector. In addition, EEOC decrees have required consideration of individuals with only a high school education. -- Training today, as I have previously indicated, does not leave room for apology by the nuclear industry. -- The pay differential may always exist but the gap has closed dramatically in a deregulated environment. There are also many crewmembers on feeder and charter lines who make less than a thousand dollars a month.

I don't believe it is a viable concern as to whether nuclear operators are professionals or technicians. Pride in their work and the self-respect that comes from having to prove they can meet high standards makes for a professional attitude. The requirements set down today should generate just that.

Management must respect and acknowledge good performance, but they should also require that standards be met. This could be extended to include appearance, the use of uniforms or insignia, etc., but decisions of this nature are best made in concert with the operators. If the subject has a part in the formulation of these decisions, their commitment to implementation is much more likely.

3. Are the utility people in charge of training adequately trained in the relevant fields (teaching, engineering, human factors) themselves?

Yes, and they maintain their qualifications through recurrent training programs. The emphasis on human factors has recently been directed towards team training. Effective training in this area will benefit both the trainers and the students.

4. Describe the accrediting process. Is the National Nuclear Accrediting Board sufficiently informed and independent? How do you believe the Board would deal with a utility that is unable to make its training programs good enough within a reasonable period of time? How long do you believe that period should be?

The accrediting process is described in the pamphlet that accompanies this letter.

The Accreditation Board's information comes from the utility's Self Evaluation Report, the Accreditation Team report and the utility's response to the Team report. Board members also periodically participate in Accrediting Team visits. Additional information is gleaned from the utility's management when they are interrogated by the Board as their programs are being considered for accreditation. -- You only have to observe one Board meeting to be convinced of its individual and collective independence!

If a utility were unable to meet the standards that have been established, they would not receive accreditation. The time allowed to meet these requirements will vary. Utilities with plants in operation in 1984 must have submitted their Self Evaluation Report by December 1986. When a program is submitted for accreditation, items that do not affect current training must be completed prior to the implementation of the next phase of training.

If this response to your questions needs any further amplification, I will be pleased to provide whatever assistance is necessary.

Sincerely

Enclosure

TESTIMONY

on

Education and Training of Nuclear Power Plant Personnel
Senate Subcommittee on Nuclear Regulation
Committee on the Environment and Public Works
U.S. Senate
June 27, 1985

by

Manuel A. Kanter
Division of Educational Programs
Argonne National Laboratory
Argonne, Illinois 60439

Gentlemen:

Before entering into my substantive testimony, I would indicate to the subcommittee that for the past ten years I have been head of the Nuclear Power Training Program at Argonne National Laboratory that is conducted for middle managers and lead technical personnel of nuclear programs in developing countries. This training is being conducted under an Agreement for Cooperation between the Government of the United States and the International Atomic Energy Agency. In this role, I have organized 30 domestic courses and 11 foreign courses--about 50% of which have been in various fields of nuclear power plant safety. In these courses, I have utilized over a thousand experts from utilities, consultants, governmental agencies, and universities, both domestic and foreign, so that I have developed a rather broad knowledge of the training of nuclear power plant personnel here and abroad.

My general observation is that the training of nuclear power plant operators under current regulations is quite adequate to the function they perform. It continues to be upgraded under the criteria set forth by the Nuclear Regulatory Commission as well as by the actions of the electric utility industry through the operations of INPO.

It is my opinion that the analogy that is often drawn between nuclear power plant operators and airline pilots is not a valid one since the duties of an airline pilot are generally of short duration and of limited time per month. The airline pilots are confronted in each flight with technical problems that tests their ability. By contrast the nuclear power plant operator has a job that is basically routine and only on occasion is he called upon for the extraordinary ability to meet unusual instances. Clearly the operator must have a thorough knowledge of the plant systems and components, their functions and their intended purpose. Ideally, he would also be expected to conceptually understand the designer's intent for the many systems involved in the nuclear plant. But because of the routine nature of this job, it is not likely that a person with the ability to conceptualize the designer's intent would be satisfied in the operator job. For this reason it is my feeling that a person with back-up responsibilities should be readily available to the operators in cases of abnormal operations. Therefore, I agree with the generally accepted industry direction in the training of operators. The changes that have been made since TMI are in my opinion admirable and largely in the right direction. For this reason, I stand in basic opposition to Senate Bill S. 16 in that I see no need for a national academy to train operators and senior operators.

However, I do see a role for a national academy in providing training to supervisors and engineers who should be in a position to provide readily available back up to the operators in unusual instances. Without defining the exact positions of these technical back-up people and the kind of organizational structure in which they would have to operate, I would like to discuss the abilities and knowledge that this kind of person should have.

This kind of person must be able to relate the analysis that is a part of every nuclear plant design to the operational aspects of the plant. It means understanding the bases of the many technical specifications that are set forth by the vendor and accepted by the USNRC. Of particular importance is a working knowledge of reliability analysis techniques by which the probabilities of the many trains of events that could follow a plant upset are recognized and thus have a guide for actions to be taken when the results of such initiating events are observed.

Ideally, this type of diagnosis is done by computer and built into the instrumentation and control of the plant; but our experience and intuition has lead us to believe that humans must be put in a position to compensate for computer failures and/or unrecognized eventualities not compensated for in the computer program.

To provide training to persons who will be required to demonstrate such abilities one must presuppose the successful completion of an engineering degree, thorough knowledge of nuclear plant systems and some experience in nuclear plant operation and design. Special training that would have three components superimposed on this background, namely, applied fundamentals, advanced operational analysis, and exact plant simulator familiarization.

Applied fundamentals training would stress the applications of principles taught in academic courses to nuclear plant practice. The training would assume that the basic knowledge of these fundamentals had been received in a BS degree in nuclear engineering. The subjects to be covered are:

- Thermal Sciences
- Electrical Sciences
- Nuclear Reactor Physics
- Plant Chemistry
- Materials Sciences

- Applied Plant Systems
- System Reliability Analysis
- Basic Radiological Protection

INPO has recommended this type of training for technical staff, but the detailed guidelines have not been developed. To my knowledge, the training is not generally available, although several utilities such as GPU and Seabrook Nuclear Plant have arranged for parts of this training through universities.

Advanced operational analysis training concerns itself with developing the ability to analyze transients in nuclear systems as well as treating the operational management of a nuclear plant to achieve safe and reliable operation. This training would include:

- Transient Analysis with Simulation. This section of the course would provide participants with case studies of transient events. Each participant would be required to develop fault-trees associated with initiating events, the time sequencing of the various system action and the decisions on actions that could be taken to interpret off-normal sequences. Computer simulation should be provided though not necessarily on a real-time basis so that participants could set parameters and experiment with the simulated systems in order to develop familiarity with the conceptualization involved. A survey of available computer hardware and software for this purpose would have to be made. Clearly, this section of the training would not involve independently going through all identified transients, but probably would consist of the participants independently dealing with three to four cases and then reviewing as a class a larger number of cases.

- Technical Specifications and Analysis of Operational Data. This section of the course would deal with the interpretation of technical specifications and the analysis of operational data to determine precursors for potential abnormal operation.

- Review of Historic Unusual Incidents.

- Operational Management. This section would deal with the organization of nuclear plant personnel, define responsibilites, and role of procedures in order to obtain safe and reliable operation.

- Maintenance Management. Review of the knowledge gained from reliability data in determining proper scheduling of and quality assurance in plant maintenance.

Exact plant simulator familiarization may or may not be necessary for this type of person since it is most likely his background would have already included training on an exact plant simulator. However, this might be an optional program.

Because the industry has not moved in response to the INPO guidelines for the training of technical and managerial personnel, I would favor the establishment of a national academy for this purpose. The structure envisioned in Senate Bill S. 16 seems appropriate to the purpose and should be able to be carried out by contract to the appropriate organizations rather than setting up a "bricks and mortar" institution. To be effective, the faculty should be prestigious and the program stringent and extensive--9 months perhaps--so that graduation from this program would be recognized in its own right without special certifications. An analogy to the Oak Ridge School of Reactor Technology that operated in the 1950's can be drawn. We might also look to the training being provided in France for its safety engineers.

In conclusion, I would support the establishment of a national safety academy that is dedicated to providing a high level of training for the technical personnel who support operations and maintenance; but I would be opposed to having that academy train the actual operators.

The statement above is that of the author and does not represent an official position of the Argonne National Laboratory.

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439

Telephone 312/972-

28 September 1985

Dr. Charles Richman
Office of Senator Moynihan
Senate Office Building
Washington, D.C. 20510

Question 1: What does Argonne National Laboratory now do that could be applied to domestic training?

Answer: Argonne National Laboratory, in its international courses, has given two courses in safety and reliability in operation. These are courses given to middle managers and lead technical personnel of developing countries with responsibilities in nuclear power operations. The last course (outline enclosed) was eight weeks long and covered much of the material I would propose as needed for nuclear safety engineers who are close to operation. In the course that ANL gave, the participants were people who would be supervisors of the nuclear safety engineers and would not have had the time nor the need to go into the detailed material that would be necessary if the same material were to be presented to nuclear safety engineers.

If ANL were to give the course for domestic purposes, we would expand it by a factor of 4 to 5 with the greatest expansion coming in two modules: Transient Analysis Related to Safety Systems Settings and Systems Reliability Analysis. The first of these in our course was three weeks long and involved hands-on familiarization with the computer codes used in the reactor design. To receive the familiarity that an actual nuclear safety engineer needs, that subject should be expanded to 8-10 weeks. Likewise, the module on Safety and Reliability Analysis, which in our course took seven days, should also be expanded to about ten weeks.

If we were to give such a course for domestic nuclear safety engineers, we would probably break it into modules of 10-12 weeks so that the engineers would not have a long absence from their jobs.

Question 2: Provide more detail about the Oak Ridge School of Nuclear Technology and the French Nuclear Safety Engineer Training?

Answer: The Oak Ridge School of Reactor Technology was fairly equivalent to a professional engineer's course, such as those given in schools like MIT. The material was covered at an advanced level with much hands-on experience and actual calculation. I don't know the detail of the curriculum but the faculty at the time consisted of leading nuclear engineers, such as Dr. Alvin Weinberg. They conducted their training in an academy atmosphere to draw out the best in the participants. I do not know if formal examinations were given but it is clear to me that the graduates of that school were very knowledgeable people.

The French Nuclear Safety Engineers Training is given to those who have completed a graduate nuclear engineering curriculum. The training is two years long and includes about one year of classroom and workshops involving nuclear plant systems. transient diagnosis. both on a deterministic and probabilistic level. It also includes about one year of hands-on training in operating reactors. I expect to gather more detailed information on that training during a visit to Paris in October.

Question 3: Should reactor operators have an engineering degree?

Answer: I believe that it is not essential for reactor operators to hold an engineering degree. It might be helpful but it seems to me holding a degree would call for promotion to supervisory jobs. I believe it is more important that their supervisors or experts with the kind of advanced training I suggest need to be assigned to have the functions of:

to maintain independence from normal plant operations as necessary to make objective evaluations concerning plant safety; and

to provide advanced technical assistance to the operating shift complement during normal and abnormal operating conditions.

Sincerely,

Manuel A Kanter

Manuel A. Kanter
Division of Educational Programs

MAK:jb
Enclosure
cc: H. O'Conner

HEARING OF THE SUBCOMMITTEE ON NUCLEAR REGULATION ON NUCLEAR REGULATORY REFORM STANDARDIZATION AND TRAINING PROPOSALS

Statement By

Dr. Lynn E. Weaver
Dean, College of Engineering
Auburn University
Auburn University, AL

The following statement is in relation to the proposed National Nuclear Powerplant Personnel Training Act of 1985.

There is no question that a centralized training facility for licensed personnel concerned with the operation of nuclear powerplants would provide for uniformity in areas of instruction, screening of applicants, prerequisite educational level of attendees, and quality of instruction. This concept does create problems in the current generation of nuclear powerplants operated by utilities. The proposed academy could provide the fundamental instruction in the various aspects of nuclear powerplant operation, however, a sizable fraction of the training must be carried out at the powerplant site, due to the diversity in design and operation of nuclear powerplants. This diversity would make it difficult to provide, in a central facility, the hands-on experience that is vital to an effective training program.

If the design of the next generation of nuclear powerplants is standardized, then serious consideration should be given to establishing central or regional training facilities to insure the highest quality of instruction obtainable.

Given the present situation, the initiative taken by the industry through the Institute of Nuclear Power Operations and the National Nuclear Accrediting Board, if carried out properly, can provide the level and quality of training to guarantee safe operation of nuclear plants. It is important that the industry continually assess and seek ways to improve the quality of instruction in their training programs. A concerted effort must be made to assure that all utility training programs are on a comparable level.

June 27, 1985

Auburn University

Auburn University, Alabama 36849-3501

School of Engineering

Office of the Dean
108 Ramsay Hall

Telephone (205) 826-4326
ACTS 923-4326

May 29, 1985

The Honorable Daniel Patrick Moynihan
Senator from New York
United States Senate
Washington, DC 20510

Dear Senator Moynihan:

The following comments are in response to your letter of May 6 relative to the National Nuclear Power Plant Personnel Training Act of 1985.

It would be desirable to establish a centralized training facility for licensed personnel concerned with the operation of nuclear power plants. Such a facility would provide for uniformity in areas of instruction, screening of applicants, pre-requisite educational level of attendees, and quality of instruction. Clearly, close interaction with the nuclear steam supply system vendors and utilities is paramount in developing the curriculum. To assure these close ties, perhaps a joint venture between government and industry would be desirable. The academy could provide the fundamental training in various aspects of nuclear power plant operation; however, additional training that is plant specific will be required and must be done by the utility at the plant site. This is an area that I feel needs more emphasis in the training program. If the design of the next generation of nuclear power plants is standardized then perhaps that aspect of the training that is now plant specific can be centralized.

I hope these comments will be of value to you.

Sincerely,

Lynn E. Weaver
Dean of Engineering

/jh

Auburn University

Auburn University, Alabama 36849-3501

College of Engineering

Office of the Dean
108 Ramsay Hall

Telephone (205) 826-4326
ACTS 923-4326

July 23, 1985

The Honorable Daniel Patrick Moynihan
Senator from New York
United States Senate
Washington, DC 20510

Dear Senator Moynihan:

The following is in reply to your letter of July 9 concerning questions relative to the hearing held on June 27.

1. I advocate a program of uniform prerequisite educational levels for reactor operators and other licensed nuclear plant personnel. This should carry through to a uniform standard in the industry for screening of applicants, training, and quality of instruction.

2. With proper training I do not believe that it is necessary for a reactor operator to have an engineering degree; however, I do recommend that the shift supervisor be a degreed engineer--but not just any engineering degree. He should possess the education that is pertinent to nuclear power plant operation--preferably a nuclear engineering degree or mechanical engineering degree with a minor in nuclear engineering.

3. I do agree with Dr. Ahearne that there is a definite distinction between technical training on how to operate a machine and technical training which gives a basic knowledge on how the machine works. I have not reviewed utility training programs recently and, therefore, cannot comment on the extent to which training programs focus on how the various components of the nuclear power system work. It would be desirable for utility management to have sufficient training in order to know the unique management requirements of a nuclear electric system compared to those of a fossil fuel electric system.

4. To my knowledge, the majority of the training programs being carried out by utilities have little engineering school involvement. Most of the materials are supplied by the reactor vendors--which is appropriate, since they are the designers of the system. It would be desirable for the materials used in teaching the fundamentals to be reviewed by professional engineering educators, if this has not already been done, and that they be standard throughout the industry.

5. Since Three Mile Island the industry has taken major steps in insuring that the design, construction and operation of nuclear plants are handled in a proper manner. However, to maintain this progress, these programs must be under constant review. Considering the number of nuclear power plants still under construction which will be placed in operation by the end of this century and the normal attrition of nuclear engineers, we run the risk of a serious shortage of engineering talent unless proper planning by government and industry is undertaken to assure that our universities provide this needed manpower.

Sincerely,

Lynn E. Weaver
Dean of Engineering

jh

II

99TH CONGRESS
1ST SESSION

S. 16

Entitled the "National Nuclear Powerplant Personnel Training Act of 1985".

IN THE SENATE OF THE UNITED STATES

JANUARY 3, 1985

Mr. MOYNIHAN introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

---

A BILL

Entitled the "National Nuclear Powerplant Personnel Training Act of 1985".

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I—FINDINGS, PURPOSES, AND DEFINITIONS

SEC. 101. The Congress finds that—

(1) there are some fifty-six thousand people working in nuclear-related jobs at civilian nuclear powerplants throughout the United States and it is estimated that an additional thirty thousand will have to be hired by 1991;

(2) the operation of civilian nuclear powerplants in a manner that is protective of human health and safety requires that plant personnel be adequately trained;

(3) approximately 38 per centum of all events that could lead to potentially significant accidents at civilian nuclear powerplants involve human errors;

(4) existing programs for training civilian nuclear powerplant personnel lack uniformity and often are not consistent with accepted professional training practices;

(5) industry group efforts to accredit the training programs of individual utilities are valuable and worthwhile but alone are not adequate; and

(6) there is a need to improve and standardize professional training for nuclear powerplant personnel.

SEC. 102. The purposes of this Act are—

(1) to ensure the availability of qualified and adequately trained personnel to operate civilian nuclear powerplants in a manner that is protective of human health and safety; and

(2) to ensure that civilian nuclear powerplant personnel are trained consistent with the rules and regulatory guidance issued by the Nuclear Regulatory Commission.

SEC. 103. Definitions as used in this Act—

(1) "academy" means the National Academy for Nuclear Power Safety;

(2) "civilian nuclear powerplant" means any production or utilization facility licensed under section 103 of the Atomic Energy Act;

(3) "Commission" means the Nuclear Regulatory Commission.

TITLE II—NATIONAL ACADEMY FOR NUCLEAR POWER SAFETY

SEC. 201. (a) ESTABLISHMENT.—The Nuclear Regulatory Commission shall establish, at the earliest practicable date, a National Academy for Nuclear Power Safety.

(b) PURPOSE.—The purpose of the academy shall be to provide training to civilian nuclear powerplant operators, senior operators, supervisors, technicians, engineers, and other appropriate personnel in nuclear-related positions.

SEC. 202. (a) SUPERINTENDENT.—The academy shall be headed by a Superintendent, who shall be appointed by the President, by and with the advice and consent of the Senate. In exercising the powers and duties under this Act, the Superintendent shall report to and be responsible to the Commission.

(b) TERM OF OFFICE.—The Superintendent shall serve for a term of four years and may be reappointed.

(c) Duties of the Superintendent.—The Superintendent shall—

(1) develop and revise curricula for training programs and courses of instruction, in consultation with the Academic Advisory Board;

(2) establish standards for admission to the academy, in consultation with the Academic Advisory Board;

(3) develop criteria for awarding certificates of training, in consultation with the Academic Advisory Board;

(4) appoint such teaching staff or other personnel as may be necessary and appropriate;

(5) establish fees and other charges for attendance at the academy or for instruction provided by academy personnel;

(6) enter into such contracts and take such actions as may be necessary to carry out the purposes of the academy.

Sec. 203. (a) Training.—The Superintendent shall, in consultation with the Academic Advisory Board and subject to the approval of the Commission, establish one or more training programs or courses of instruction for civilian nuclear powerplant personnel. Such programs or courses may be conducted for the purpose of qualification or requalification of nuclear powerplant personnel, or for the purpose of providing continuing education, on-the-job training, or instruction in special safety guidance.

(b) TYPES.—There shall be, at a minimum, a training program or course of instruction for each positioin for which the Commission requires a license pursuant to section 107 of the Atomic Energy Act.

(c) CONTENT.—Each training program or course shall, at a minimum, include instruction in subject areas that the Commission has identified, either by rule or regulatory guidance, as being necessary and appropriate for the safe operation of civilian nuclear powerplants.

SEC. 204. (a) ADMISSIONS.—The Superintendent is authorized to admit to the programs or courses given by the academy individuals who meet the standards for admissions established by the Superintendent, in consultation with the Academic Advisory Board and subject to the approval of the Commission. Admission standards may vary by program or course of instruction. Admission standards shall be consistent with Commission rules or regulatory guidance as they relate to qualification, education and experience requirements for each category of civilian nuclear powerplant personnel.

SEC. 205. (a) INSTRUCTION FEE.—Each individual participating in a training program or course of instruction provided by the academy shall be required to pay a fee for such a program or course. Such fee shall be set at an amount equal to the cost of the academy of providing such training.

SEC. 206. (a) ACADEMIC ADVISORY BOARD.—There shall be established an Academic Advisory Board for the academy. Such Board shall consist of seven members to be appointed by the President, by and with the advice and consent of the Senate. The President shall designate one member as Chairman.

(b) TERMS.—Each member shall serve for a term of four years. The terms of the members first taking office shall expire as follows: one (as designated by the President) at the end of one year, two (as designated by the President) at the end of two years, two (as designated by the President) at the end of three years, and two (as designated by the President) at the end of four years.

(c) COMPOSITION.—In nominating persons for the Academic Advisory Board, the President shall ensure that the membership of the Board be balanced, with broad representation from various interests, backgrounds, occupations, and experience appropriate to the responsibilities of the Board.

(d) RESPONSIBILITIES.—The Academic Advisory Board shall advise the Superintendent on the academy's curricula and admissions standards, and on any other matters related to the academy's training programs and courses as determined appropriate by the Superintendent, subject to the approval of the Commission.

(e) COMPENSATION.—Each member of the Academic Advisory Board shall be reimbursed for any expenses actually incurred by him in the performance of his duties as a member of such Board.

SEC. 207. (a) BOARD OF VISITORS.—There shall be established for the academy a board of visitors composed of the following—

(1) the chairman of the Senate Committee on Environment and Public Works, or his designee;

(2) three other Members of the Senate designated by the President pro tempore of the Senate;

(3) the chairman of the House Committee on Interior and Insular Affairs, or his designee;

(4) the chairman of the House Committee on Energy and Commerce, or his designee;

(5) three other Members of the House designated by the Speaker; and

(6) six persons designated by the President.

(b) TERMS.—The persons designated by the President shall serve for three years.

(c) DUTIES.—The function of the board of visitors shall be to review annually the program of the academy and to make comments and recommendations to the Superintendent, Commission, and Congress regarding the operation of the academy and any improvements therein that the board of visitors deems appropriate.

(d) COMPENSATION.—Each member of the board of visitors shall be reimbursed for any expenses actually incurred by him in the performance of his duties as a member of such Board.

SEC. 208. PERSONNEL APPOINTMENTS.—Appointments of a teaching staff may be made, subject to the approval of the Commission, without regard to the provisions of title 5, United States Code, governing appointments in competitive service, and, with respect to temporary and intermittent services, to the same extent as is authorized by section 3109 of title 5, United States Code.

SEC. 209. PHYSICAL FACILITIES.—The academy shall be located on such site as the Commission selects.

SEC. 210. COORDINATION.—In establishing and conducting training programs or courses under this title, the Superintendent and the Commission shall take full advantage of applicable resources and information available from other departments and agencies of the Federal Government, business and industry groups or associations, and public interest groups.

SEC. 211. (a) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out the provisions of this title such sums as may be necessary.

(b) CONSTRUCTION.—Of the sums authorized to be appropriated under subsection (a), such sums as may be necessary shall be available for the construction of facilities of the academy on the site selected under section 209.

(c) EQUIPMENT.—Of the sums authorized to be appropriated under subsection (a), such sums as may be necessary shall be available for the purchase or leasing of equipment to be used in the training programs or courses of instruction offered by the academy.

TITLE III—DUTIES OF THE NUCLEAR REGULATORY COMMISSION

SEC. 301. OPERATORS' LICENSE REQUIREMENTS.—As a condition of a license issued under section 107 of the Atomic Energy Act, the Commission shall, as appropriate, require certification of successful completion of the applicable training programs or courses of instruction offered by the academy.

SEC. 302. COMMERCIAL LICENSE REQUIREMENTS.—As a condition of a license issued under section 103 of the Atomic Energy Act, the Commission shall, as appropriate, require a licensee to employ personnel that have successfully completed the applicable training programs or courses of instruction offered by the academy.

II

99TH CONGRESS
1ST SESSION

S. 836

To amend the Atomic Energy Act of 1954, as amended, to improve the nuclear powerplant siting and licensing process, and for other purposes.

IN THE SENATE OF THE UNITED STATES

APRIL 2 (legislative day, FEBRUARY 18), 1985

Mr. SIMPSON (by request) introduced the following bill; which was read twice and referred to the Committee on Environment and Public Works

---

A BILL

To amend the Atomic Energy Act of 1954, as amended, to improve the nuclear powerplant siting and licensing process, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Nuclear Powerplant Licensing and Standardization Act of 1985".

TABLE OF CONTENTS

Sec. 2. Findings and purposes.

TITLE I—SITING AND LICENSING

Sec. 101. Construction permits and operating licenses.
Sec. 103. Early site review.
Sec. 104. Approval of designs.

TITLE II—MISCELLANEOUS PROVISIONS

Sec. 201. Thermal neutron power generation facility.

Sec. 202. Standardized design.
Sec. 203. Implementation.

TITLE III—CONFORMING AMENDMENTS

Sec. 301. Antitrust provisions.
Sec. 302. General provisions.
Sec. 303. License applications.
Sec. 304. Revocation.
Sec. 305. Table of contents.

TITLE IV—EFFECTIVE DATE

Sec. 401. Effective date.

FINDINGS AND PURPOSES

SEC. 2. (a) The Congress, recognizing that a clear and coordinated energy policy consistent with public health and safety must include an effective and efficient licensing process for siting, construction, and operation of nuclear powerplants which meet applicable criteria, finds and declares that—

(1) interstate commerce is substantially affected by the siting, construction, and operation of nuclear powerplants;

(2) opportunity for public participation in siting and licensing of nuclear powerplants should be assured;

(3) the licensing and construction of nuclear powerplants would be facilitated and the public health and safety enhanced by the use of preapproved nuclear powerplant designs, particularly standardized designs;

(4) there is a need to encourage the development and use of standardized nuclear powerplant designs because such designs can benefit public health and safety by concentrating the resources of designers, engineers,

and vendors on particular approaches, by stimulating standardized programs of construction practice and quality assurance, by improving the training of personnel and by fostering more effective maintenance and improved operations, and because the use of such designs can permit a more effective and efficient licensing and inspection process;

(5) the licensing process would be facilitated by procedures for the selection and approval of a site for a nuclear powerplant to be accomplished in advance of a commitment to construct a particular facility of a specific design at that site;

(6) the licensing process would be facilitated if licensing decisions are made at the earliest feasible phase of the process and, if an opportunity for hearing has been provided, licensing issues are not subject to further adjudication in the absence of an evidentiary showing called for by this Act and the regulations of the Commission;

(7) all phases of the licensing process should be handled in a timely manner under procedures which, consistent with this Act and the regulations of the Commission, assure that adjudicatory procedures are only invoked where a relevant dispute can only be re-

solved with sufficient accuracy through such procedures;

(8) consistent with the adequate protection of the public health and safety and the common defense and security, the regulatory process should provide greater stability in licensing standards and criteria for approved designs of nuclear powerplants;

(9) consistent with the Commission's paramount responsibility to protect the public health and safety, and recognizing that elimination of all risk is an unattainable goal for any energy source, it is appropriate and in the public interest for the Commission to consider the economic consequences of its regulatory practices including, but not limited to, the cost of safety requirements; and

(b) The purposes of this Act are—

(1) to facilitate the use of preapproved sites and designs for nuclear powerplants and to facilitate the development and use of standardization designs;

(2) to provide for the issuance of a combined license to construct and to operate a nuclear powerplant under conditions which assure the continued protection of the public health and safety and which will be in accord with the common defense and security;

(3) to improve the stability of licensing standards and criteria for nuclear powerplants and thus the finality of prior Commission licensing approvals; and

TITLE I—SITING AND LICENSING

CONSTRUCTION PERMIT AND OPERATING LICENSES

SEC. 101. Section 185 of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"SEC. 185. CONSTRUCTION PERMITS AND OPERATING LICENSES.—

"a. All applicants for licenses to construct or modify production or utilization facilities shall be initially granted a construction permit after the Commission has provided an opportunity for public hearing pursuant to section 189 of this Act and if the application is otherwise acceptable to the Commission. Upon the completion of the construction or modification of the facility, upon the filing of any additional information needed to bring the original application up to date, after providing an opportunity for public hearing pursuant to section 189 of this Act, and upon finding that the facility authorized has been constructed and will operate in conformity with the application as amended and in conformity with the provisions of this Act and of the regulations of the Commission, and in the absence of any good cause being shown to the Commission why the granting of an operating license would not be in accordance with the provisions of this

Act, the Commission shall thereupon ~~issue~~ an operating license for the applicant. For all other purposes of this Act, a construction permit is a 'license'.

"b. Notwithstanding any other provision of this section, the Commission shall issue to the applicant a combined construction permit and operating license for a thermal neutron power generation facility after providing an opportunity for public hearing pursuant to section 189 of this Act, if the application contains sufficient information to support the issuance of a combined construction permit and an operating license in accordance with the regulations of the Commission and the Commission determines that there is a reasonable assurance that the facility will be constructed and will operate in conformity with the application, the provisions of this Act, and the rules and regulations of the Commission. The Commission shall identify within such combined construction permit and operating license the inspections, tests, and analyses which shall be performed and the acceptance criteria therefor which will provide reasonable assurance that the plant has been constructed and will operate in accordance with the license. After issuance of a combined construction permit and operating license for a thermal neutron power generation facility, the Commission shall assure through inspections, tests and analyses that construction is completed in conformity with the combined construction permit and operating license, consistent with the regulations of the Commission.

"Prior to the commencement of operation of any facility licensed under this subsection, the Commission shall publish in the Federal Register a notice of the intended operation of such facility, and shall provide a thirty-day period during which any person may file a written objection to the commencement of operation on the basis that the facility authorized has not been constructed or will not operate in conformity with the license. Such objection shall set forth in reasonable detail the facts and arguments upon which the objection is based, and may be accompanied by a request for a hearing.

"If a hearing is requested, the Commission shall determine whether good cause exists therefor and, if so, the issues to be heard and whether the hearing must precede commencement of operation of the facility in order to provide reasonable assurance of the protection of the public health and safety and common defense and security. The Commission may designate an issue for a hearing only if the issue consists of a substantial dispute of fact, necessary for the Commission's decision, that cannot be resolved with sufficient accuracy except at a hearing and:

"(i) the issue was not and could not have been raised and resolved in any proceeding for the issuance, modification or amendment of a license, permit, or approval for that facility, its site, or design; or

"(ii) a showing has been made that (I) there has been nonconformance with the license; (II) such nonconformance has not been corrected; and (III) such nonconformance could materially and adversely affect the safe operation of the facility.

"Following completion of any hearing held, the Commission shall decide whether the license to construct and operate should be modified. Operation of the facility shall commence based on the combined construction permit and operating license unless the Commission determines that good cause exists for delaying such operation.

"c. The Commission shall not modify any final determination on an issue that has been considered and decided in any proceeding for the issuance of a permit or license for that facility, facility site, or approval of design for that facility under section 194, unless it determines, based on significant new information, that a modification is required to protect the public health and safety or the common defense and security and that the modification proposed will substantially enhance the public health and safety or the common defense and security by improving overall safety of facility operation.".

EARLY SITE REVIEW

SEC. 103. The Atomic Energy Act of 1954, as amended, is amended by adding a new section 193 to read as follows:

"SEC. 193. EARLY SITE REVIEW.—

"a. The Commission is authorized to issue a site permit for approval of a site or sites for one or more production or utilization facilities for a period of ten years upon the application of any person or entity notwithstanding the fact that no application for a construction permit or a combined construction permit and operating license for such facility or facilities has been filed. The Commission may issue a site permit with respect to limited aspects of the suitability of the site for its intended purpose, under relevant regulations of the Commission.

"b. Notwithstanding section 161 w. of this Act or the Independent Offices Appropriation Act of 1952, no application filing or issuance fees shall be required for an application for a site permit, an amendment, or a renewal of a site permit under this section. The Commission is authorized to allocate the costs that would otherwise have been defrayed by fees required of applicants under this section among applicants for permits or licenses which propose to use the approved site in a manner that will assure full cost recovery by the Commission. If no application for construction of a production or utilization facility is filed within the initial ten-year approval period, any outstanding fee shall become immediately due and payable by the applicant for the site permit.

"c. After considering all information submitted in the application and after providing an opportunity for hearing pursuant to section 189 of this Act, the Commission shall issue a site permit if it determines that such approval will not be inimical to the common defense and security or to the health and safety of the public.

"d. (1) A site permit issued by the Commission under this section may be referenced in an application for a construction permit or a combined construction permit and operating license which meets the conditions of the site permit and is filed within the period during which the site permit remains valid.

"(2) No less than twelve or more than thirty-six months prior to the expiration of the ten-year period, the holder of the site permit may apply for a renewal of the site permit. The Commission shall renew the site permit for an additional period of time of not less than five nor more than ten years from the date of renewal unless it finds that the site will not comply with this Act or the Commission's regulations. If no application for a production or utilization facility is filed within the period of renewal, any outstanding fee for the renewal application or issuance shall become due and payable by the applicant for the site permit.

"e. Approval of a site under this section shall not preclude its use as a site for an alternate or modified type of energy facility or for any other purpose. Other uses not considered in the approval may, however, affect the validity of the site permit or the conditions of its use for production or utilization facility siting as the Commission may determine.

"f. Following the issuance of a site permit under this section, and any subsequent Commission proceeding involving a site for which a site permit has been granted under this section, the Commission shall not modify any final determination on an issue that has been considered and decided in the site permit proceeding unless it determines, based on significant new information, that a modification is required to protect the public health and safety or the common defense and security and that the modification will substantially enhance the public health and safety or the common defense and security.".

APPROVAL OF DESIGNS

SEC. 104. The Atomic Energy Act of 1954, as amended, is amended by adding a new section 194 to read as follows:

"SEC. 194. APPROVAL OF DESIGNS.—

"a. The Commission is authorized and directed to establish procedures permitting the approval of standardized facility designs for thermal neutron power generation facilities for a period of ten years, notwithstanding the fact that no application for a construction permit or combined construction permit and operating license for such facility has been filed. The Commission may also consider, in accordance with its regulations, requests under this section for the approval of the design for any major subsystem which represents a discrete element of a thermal neutron power generation facility.

"b. Notwithstanding section 161 w. of this Act or the Independent Offices Appropriation Act of 1952, no application filing or issuance fees shall be required for an application for a design approval, an amendment, or a renewal of an approval of a facility design under this section. The Commission is authorized to allocate the costs that would otherwise have been defrayed by fees required of applicants under this section among applicants for permits or licenses which propose to use the approved standardized plant design in a manner that will assure full cost recovery by the Commission. If no application for construction of a facility is filed within the initial ten-year approval period, any outstanding fee shall become immediately due and payable by the applicant for the design approval.

"c. After considering all information submitted in the application, and after providing an opportunity for hearing pursuant to section 189 of this Act, the Commission shall issue an approval if it determines that such approval will not be inimical to the common defense and security or to the health and safety of the public.

"d. (1) Any approval issued by the Commission under this section may be referenced in an application for a construction permit, an operating license or a combined construction permit and operating license which meets the conditions of the approval and is filed within the period during which the approval remains valid.

"(2) No less than twelve or more than thirty-six months prior to the expiration of the ten-year period, the holder of the approval may apply for a renewal of the approval. The Commission shall renew the approval for an additional period of time of not less than five nor more than ten years from the date of renewal unless it finds that the design will not comply with this Act or the Commission's regulations. If no application for construction of a facility is filed within the renewal period, any outstanding fee for the renewal or issuance shall become due and payable by the applicant for the design approval.

"e. Following the issuance of a design approval under this section, and in any subsequent Commission proceeding involving a facility design for which a design approval has been granted under this section, the Commission shall not modify any final determination of an issue that has been considered and decided in the design approval proceeding unless it determines, based on significant new information, that a modification is required to protect the public health and safety or the common defense and security and that the modification proposed will substantially enhance the public health and safety or the common defense and security by improving overall safety or security of facility operation.

"f. (1) The Commission shall approve an amendment to a design approval issued under this section upon application by the holder of the design approval if the Commission determines that the amendment will comply with this Act and the Commission's regulations.

"(2) Any amendment approved by the Commission under paragraph (1) shall apply to any application for a construction permit or combined construction permit and operating license referencing the design approval for which the amendment has been granted that is filed after the effective date of such amendment.

"(3) Any amendment approved by the Commission under paragraph (1) shall not apply to an application for a construction permit or combined construction permit and operating license referencing the design approval for which the amendment has been granted that is filed before the effective date of each amendment unless (A) the applicant requests that such amendment apply to the application, or (B) the requirements of subsection (e) are satisfied with respect to the amendment.

"g. Any application for a construction permit, an operating license or a combined construction permit and operating license or any amendment to such licenses referencing a design approval issued under this section may include a request for a variance from one or more elements of the design approval. Such requests shall be granted if the Commission determines that the variance will comply with this Act and the Commission's regulations. Any variance issued under this section shall be limited to the permit or license for which such variance has been requested.".

TITLE II—MISCELLANEOUS PROVISIONS

DEFINITIONS

Sec. 201. Section 11 of the Atomic Energy Act of 1954, as amended, is amended by adding new subsection dd. as follows:

"dd. 'Thermal neutron power generation facility' means a utilization facility which is designed to produce electrical energy and in which core power is designed to be produced predominantly by thermal neutron fission.".

Sec. 202. For the purposes of this Act the term "standardized design" means a design which the Commission determines is sufficiently detailed and complete to support licensing of a commercial production or utilization facility or approval of a major portion of such a facility when referenced in an application for a construction permit and operating license or a design approval and which is usable for a multiple number of units and/or at a multiple number of sites without reopening or repeating the review.

SEC. 203. a. The Commission shall, within one hundred and eighty days following the effective date of this section, propose regulations establishing procedures and criteria for implementing the provisions of sections 185 d., 193 f., and 194 e. of this Act for the control of the application of new requirements to any thermal neutron power generation facility licensed for construction or operation under this Act.

b. After the regulations referred to in subsection a. of this section become effective, no license, permit or approval granted under this Act for a thermal neutron power generation facility shall be modified except pursuant to such regulations.

TITLE III—CONFORMING AMENDMENTS

ANTITRUST PROVISIONS

SEC. 301. Subsection 105 c. of the Atomic Energy Act of 1954, as amended, is amended in the first sentence of paragraph (2) by inserting "and/" after the word "construct".

GENERAL PROVISIONS

SEC. 302. Section 161 o. of the Atomic Energy Act of 1954, as amended, is amended by inserting the words "or approvals authorized by section 193 and 194" after the number "104".

LICENSE APPLICATIONS

SEC. 303. Subsection 182 b. of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"b. The Advisory Committee on Reactor Safeguards shall review each application under section 103 or section 104 b. for a construction permit and/or an operating license for a facility; any application under section 104 c. for a construction permit and/or operating license for a testing facility; any application under section 104 a. or c. specifically referred to it by the Commission; any application for a site permit under section 193; any proposed approval for a facility design under section 194; any proposed authorization to commence operation under section 185 b.; and any application for an amendment to a construction permit or to an operating license under section 103 or 104 a., b., or c. or an amendment or renewal of a site permit under section 193 or an amendment or renewal of an approval for a facility design under section 194 specifically referred to it by the Commission, and shall submit a report thereon which shall be made a part of the record of the application and available to the public except to the extent that security classification prevents disclosure.".

REVOCATION

SEC. 304. Section 186 a. of the Atomic Energy Act of 1954, as amended, is amended by inserting the words "sections 182, 185, 193 and 194" after the words "required under".

TABLE OF CONTENTS

SEC. 305. The Table of Contents for the Atomic Energy Act of 1954, as amended, is amended by changing the title of section 185 to read "Construction Permits and Operating Licenses" and by adding the following after section 192:

"Sec. 193. Early Site Review.
"Sec. 194. Approval of Designs.".

TITLE IV—EFFECTIVE DATE

SEC. 401. All sections of this Act shall take effect as of the date of enactment, and shall apply to all proceedings pending as of the date of enactment or commenced on or after the date of enactment, in accordance with the terms of this Act.

NUCLEAR REGULATORY REFORM

THURSDAY, JULY 11, 1985

U.S. Senate,
Committee on Environment and Public Works,
Subcommittee on Nuclear Regulation,
Washington, DC.

The subcommittee met at 2:08 p.m. in room SD-406, Dirksen Senate Office Building, the Hon. Alan K. Simpson (chairman of the subcommittee) presiding.

Present: Senators Simpson and Moynihan.

OPENING STATEMENT OF HON. ALAN K. SIMPSON, U.S. SENATOR FROM THE STATE OF WYOMING

Senator Simpson. Good afternoon.

I want to thank my good colleague from New York who has been very loyal in his attendance and in his participation and very, very helpful to me in my work in this curious arena, and I appreciate it deeply.

We meet to consider the subject of nuclear licensing and regulatory reform, and in particular, two legislative proposals that are before the Congress, one from the NRC and one from the Department of Energy, both intended to encourage a greater use of standardized nuclear powerplant design.

I do apologize to all of you for having canceled the June 26 hearing that we originally had scheduled on this subject, but I had an unavoidable conflict that arose on very short notice. I am especially grateful to all of you who were able to rearrange your schedules to be here today, and particularly to those of you who came from out of town. I deeply regret any inconvenience the earlier cancellation caused in your schedules and appreciate your understanding.

Today, we consider the two legislative proposals to encourage greater use of standardized nuclear powerplant designs by the commercial nuclear power industry and to make changes in the manner in which nuclear powerplant facilities are granted their license by the Nuclear Regulatory Commission.

S. 836, which was forwarded to the Congress by the NRC earlier this year, has been referred to this committee. A similar bill transmitted by the Department of Energy was referred to the Senate Energy Committee. We will be interested in the views of the various witnesses today on both of those proposals.

So I am especially interested on what steps we, in Congress, must take to lay the groundwork for greater use of standardized designs in the next generation of nuclear powerplants. We are just now discovering that the initial decisions regarding construction of new capacity are upon us now. I feel we have an obligation to assure that whatever energy option is pursued, that the Federal regulatory approach is sensible and disciplined.

In that regard, we have much to do in the nuclear area before we reach that objective. Senator Moynihan, do you have something you wish to share. You will be pursuing the training issue, as well as this issue with regard to the NRC today.

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator **Moynihan**. Thank you, Mr. Chairman. Perhaps it might be useful to the Commissioners and our guests to just briefly recount the hearing that took place on June 27. We met with representatives of the industry and of the nuclear sciences and the Academy and other knowledgeable persons on the question of how we train the people who run our nuclear powerplants. We learned that the utilities, on their own and through groups such as INPO—I will use that acronym—have expended an extraordinary amount of effort to improve the status of training since the Three Mile Island accident in 1979.

What was striking was how much has been done and by inference, how much needed to be done and how little had been done previously.

There was agreement that this is a process begun. Dr. Manuel Canter of the Argonne Laboratories made the point that utility management needs to be trained as well as reactor operators. This was a very striking assertion that we are a utility industry with a background of a generation of power using fossil fuels, and now they have moved to this wholly new technology. Management is not just the special training of people in these new plants but the management of the people responsible for them.

Dr. Ahern of Resources for the Future argued that training needs to be more uniform than INPO had been able to mature to date, and then we heard one large proposition which is that in these plants on site there is a need, not just for persons who know how to work the machines but the persons who know how the machines work. Various terms were used; safety engineers was one such.

We heard a fair amount of specifics about cases in which the operators do not have sufficient knowledge of, and confidence in, their machines and were reacting to situations in which the machine was quite capable of handling but they didn't understand the machine that well.

We found it a very useful hearing, and it was a very cooperative one, and we thank you very much for making it possible.

Senator **Simpson**. You are very welcome, sir, and it was very well conducted, too. I know we gained the information we needed to make good decisions.

With that, we will proceed with the hearing. The first group to testify is Nunzio Palladino, the Chairman of the Nuclear Regulatory Commission and you, sir, are accompanied by Commissioners Asselstine, Bernthal, and Zech.

It is good to have you here. We certainly appreciate your going forward with your remarks.

STATEMENT OF NUNZIO J. PALLADINO, CHAIRMAN, NUCLEAR REGULATORY COMMISSION, ACCOMPANIED BY COMMISSIONER JAMES K. ASSELSTINE; COMMISSIONER FREDERICK M. BERNTHAL; AND COMMISSIONER LANDO W. ZECH, JR.

Mr. PALLADINO. Thank you, Mr. Chairman.

Mr Chairman, Mr. Moynihan, I am pleased to appear before the committee today to discuss the Nuclear Powerplant Licensing and Standardization Act of 1985 which you, Mr. Chairman, were kind enough to introduce on request on April 2, 1985, as S. 836.

As you noted, with me today are my fellow commissioners and also members of the staff who will help me answer any questions.

The objective of S. 836 is to improve the stability of the licensing process through legislative provisions for standardization, early site review and the issuance of a combined license to construct and operate nuclear powerplants under conditions which assure the continued protection of the public health and safety and which will be in accord with the common defense and security.

Increased stability is to be achieved principally by provisions in the bill which call for industry to specify more completely prior to the start of construction their plans for design, construction and operation of a proposed facility. Concomitantly, the Commission would specify the inspections, tests, analyses and acceptance criteria to be applied in the regulatory review. The opportunity for the NRC staff to complete a well-integrated, comprehensive safety review would provide additional assurance of overall safety and reliability. There would also be a more disciplined process for modifying approved designs. In addition, the legislation includes a well ordered, disciplined process for timely and responsible public participation.

The proposed legislation, if adopted, would amend existing section 185 of the Atomic Energy Act to permit issuance of what we would call a combined construction permit and operating license, which I will term CP/OL, and thereby facilitate NRC review of essentially complete designs prior to construction.

The combined CP/OL would identify and incorporate by reference the inspections, tests, and analyses that would be required to be performed and the acceptance criteria therefore to assure the adequacy of construction and compliance with regulatory requirements. This should enhance the quality of construction of nuclear powerplants and add stability to the regulatory process and facilitate public participation in nuclear powerplant licensing decisions.

In connection with section 185, I would like to note that the majority of the Commission has recently approved a modification to the language we previously submitted. The revised language appears in section 185-B. The majority opinion, as well as my own different comments, are discussed in detail in my prepared statement, which I would like to submit for the record.

Senator SIMPSON. Without objection.

Mr. PALLADINO. The proposed legislation also adds two new sections intended to permit the resolution of site-specific questions at an early stage in the licensing process and to encourage the development and use of standardized designs. Section 193, early site review, and section 194, approval of designs, are new sections which authorize the Commission to issue a site permit or a facility design approval even though no application for a construction permit or a combined CP/OL has been filed. These sections have been proposed to facilitate early identification and resolution of site and design issues after giving the opportunity for public participation. These sections would also allow subsequent facility applications to reference a site permit or design approval and have the final determinations to be made binding unless there is a substantial reason not to do so.

The use of standard designs offers the potential to reduce today's lengthy construction times and costs. More importantly, however, from the viewpoint of the Commission, standardization should facilitate high quality construction and safety operation of specific plant designs.

The proposed legislation looks to the future and to the growing demand for electricity. Although no new powerplants have been ordered for several years and although there is no clear indication of when new orders may be generated, it seems prudent to improve the system now. The regulatory apparatus ought not to be an unwarranted obstacle to the continued integration of nuclear power into the national energy mix if and when the need may arise.

In conclusion, the majority of the Commission is of the opinion that S. 836 provides a vehicle by which the Commission can improve the quality, effectiveness and efficiency of the licensing process consistent with the protection of the public health and safety and the opportunity for responsible public participation in the process.

Mr. Chairman, the committee requested comments on S. 16, the National Nuclear Powerplant Personnel Training Act of 1985, which was introduced by Senator Moynihan on January 3, 1985, and proposes that NRC establish a National Academy for nuclear power safety to train civilian nuclear powerplant personnel in basic, safe nuclear powerplant operations.

The goal of the proposed Academy is commendable, and we strongly support improved training. We do have several concerns with this bill that merit careful consideration. These concerns are detailed in my prepared statement for the record. However, I would like to mention two briefly.

The proposed Academy would be best suited to providing basic theory and possibly some generic reactor vendor training. The remainder of the training requires emphasis on plant specific details. Therefore, INPO's accreditation program or NRC approval of licensee programs would still be necessary to ensure appropriate plant-specific training. One concern is that the relationships between Academy training and INPO accreditation be evaluated and specified in order not to adversely impact on ongoing programs.

Another concern is that the NRC sponsorship of a national Academy could be seen as conflicting with our regulatory role to license reactor operators, including, for example, operators trained at the Academy. Sponsorship by some other independent agency or organization, an agency such as DOE, might be more appropriate.

It is necessary to evaluate whether the goal of improved training cannot be achieved through existing organizations and programs. Today, efforts are under way to improve training, and consideration of an Academy should be evaluated in the light of the present endeavors by the NRC, the industry, and academic institutions.

While encouraging improved training programs, the Commission cannot at this point fully endorse the nuclear academy proposal as the best way to achieve such improvement.

Commissioners Zech and Commissioner Asselstine support the Moynihan bill in principle, certainly for the long term. They believe that more consideration needs to be given to how it would be implemented and specifically to how education and basic training would be integrated with simulator and on-the- job training and even plant-specific training. They believe that a national academy, as described in the Moynihan bill, could contribute to the increased safety of nuclear powerplant operations.

This concludes my oral remarks, Mr. Chairman. We appreciate the opportunity to discuss this important matter with the subcommittee this afternoon, and we will be glad to respond to any questions you may have.

Other Commissioners may have opening statements if you wish to hear them.

Senator SIMPSON. Thank you very much. In line with your request, I would hear from any other Commissioner that would want to state something briefly.

Mr. ASSELSTINE. Mr. Chairman, I have a couple of comments.

Senator SIMPSON. Yes, Mr. Asselstine?

STATEMENT OF JAMES K. ASSELSTINE, COMMISSIONER, NUCLEAR REGULATORY COMMISSION

Mr. ASSELSTINE. While I support the legislation to bring about the greater use of standardization in nuclear powerplant design and to correct some of the quality assurance, construction, and management quality problems that have occurred in recent years, I cannot support the Commission's proposal in its present form. The Commission's proposal, in my view, does not go far enough in the development of complete standardized designs, and it contains some flawed provisions which could undermine current safety standards and unreasonably restrict the public's right to participation in public licensing procedures. My concerns about the Commission's proposal are as follows:

Under the Commission's previous legislative proposal, which I supported, the provision allowing for the issuance of a combined construction and operating license required the application to contain sufficient information to support both the issuance of the permit and an operating license in accordance with present Commission regulations. The Commission has watered this down to require submission merely of sufficient information to support issuance of a combined construction permit and operating license.

The Commission has not explained why a combined CP/OL should require less information than the separately issued construction permit and operating license, nor has it defined in the bill the level of information needed to issue a combined CP/OL.

I am pleased that a majority of the Commission has agreed to modify the Commission's proposal to require a finding, prior to the plant operation, on the adequacy of the plant's construction. I would have gone further to require preoperational reviews of the plant's readiness for operation, the sufficiency of emergency planning measures and any significant safety issues not previously considered.

The Commission also argues that the inspections, tests, analyses and acceptance criteria specified in the combined license assure the proper construction of the plant and its readiness for operation. While I certainly support efforts to attempt to define in advance the measures that we intend to use to verify the adequacy of construction and the readiness for operation, I am somewhat skeptical that such efforts will necessarily answer all questions and identify all possible concerns.

Indeed, our unfortunate experiences in recent years with unforseen safety problems and with construction projects which have run into difficulties and that have, in some cases, been canceled, provides the basis for such skepticism. The legislation should be clear that completion of these inspections, tests, and analyses are a necessary but perhaps not sufficient basis in all cases for authorization of plant operation.

The Commission's 1985 bill would place a very high threshold on the ability of a member of the public to obtain a hearing after the issuance of a combined license. In order to designate an issue for a hearing, the Commission would have to find that: The issue consists of a substantial dispute of fact; resolution of the issue is necessary for the Commission's decision; and the issue cannot be resolved with sufficient accuracy except at a hearing; and either the issue is not and could not have been raised and resolved in any prior proceeding for that facility or that there has been a nonconformance with the license; such nonconformance has not been corrected and such nonconformance could materially and adversely affect the safe operation of the plant.

As a practical matter, this thicket of obstacles will make it impossible for people living close to a plant to obtain a hearing on issues such as emergency planning, adequacy of plant construction and readiness for operation, which are of great concern to them. I am opposed to these new obstacles to State and public participation in our licensing proceedings, and I believe that the smooth operation of a licensing system does not require the public's hearing rights to be artificially restricted.

Indeed, I am persuaded that the Commission's efforts to silence the public will only stimulate opposition to future nuclear powerplants.

In addition, I would point out that the combined construction permit and operating license, early site review, and standardized design provisions of the bill contain a statutory limitation on backfitting. Putting aside my reservations about the wisdom of the Commission's proposed backfitting standard, I recommend that the Congress not enact these provisions.

As the Commission itself noted when it submitted its 1983 proposal, this is a problem which can be better addressed in the Commission's regulations. The Commission has had relatively little experience with formal backfitting standards. If this formulation turns out to be unworkable and detrimental to safety, the regulations could be modified easily. The statute would be far more difficult to amend.

For the foregoing reasons, I believe that the Commission's proposal should be redrafted: One, to ensure that plants with combined CO/OLs meet the same safety standards as plants licensed under the present regulatory scheme; and two, to afford interested States and members of the public an opportunity for a hearing prior to plant operation on issues such as emergency planning, adequacy of plant construction, and readiness for operation.

In addition, I believe that the licensing and standardization bill should include other provisions not found in the Commission's proposal to bring about the greater use of improved standardized designs and to address some of the construction and quality assurance problems which have been identified in recent years.

To that end, I would recommend adding provisions to the bill to require that future nuclear powerplants applications use essentially complete standardized plant designs which incorporate as key design elements greater simplicity, larger margins of safety, and other characteristics that promote more efficient construction, operation, maintenance, and reliability.

I would also recommend requiring that future plant applications use a centralized management approach for the construction project with specified checkpoints to assure adequate quality as construction proceeds. Such provisions would do much, in my view, to correct mistakes of the past.

Mr. Chairman, I would like to add just a couple of comments on Senator Moynihan's bill, if I could. I agree, as Chairman Palladino noted, with the concept of the Nuclear Safety Academy, although perhaps I differ on some of the details of the bill.

I would recognize that the INPO Accreditation Program and the utilities' efforts since the Three Mile Island accident have gone a long way in improving the training situation in this country, in a variety of areas, including key areas of plant operations and maintenance.

For the most part, I have been very impressed with the utility efforts, and I think good progress is being made. But I'm not sure that the training programs as they are now established and the INPO accreditation are the entire answer to the problem.

Let me mention a couple of key areas. First, there is a real shortage of skilled and experienced manpower within the industry, and that can serve as a disincentive to improved safety. Let me give you an example. We require utilities to have shift technical advisers who are engineers or have equivalent engineering training to work with the shifts in the plant. Some utilities have taken the step of actually licensing those people, giving them a license which puts them on the same footing with other members of the operating shift in the plant and which also demonstrates their detailed knowledge and understanding of the plant and its procedures.

I have been concerned by a few utilities recently that have told me they did not take the step of licensing the shift technical advisers, and the reason they did not was because it would make those people too attractive. They would be hired away from them and taken by other utilities. I think that is a problem, and I think this manpower shortage, through actions like that, can serve as a disincentive to improving safety.

Another problem that we face is the challenge of upgrading the engineering knowledge and skills of the licensed reactor operators that we have in the pool now. Many of these people are not degreed engineers and do not have college engineering training. Yet we recognize that engineering knowledge is a key element in the operator's ability to deal particularly more severe accident situations.

Senator Moynihan, I think as you pointed out, you not only need people who know how to work the machines, but know how the machines work, and this is a key part of that.

It seems to me that although some utilities have made efforts to work with universities to obtain cooperative degree programs for their employees, that more needs to be done in this area. It seems to me that the particular value that an academy would have would be to provide people with basic engineering knowledge and training, and then feed those people out into the individual utility training systems where they could receive the specific training that they need to operate individual plants.

I think that is essential because of the wide variations and the lack of standardization among the plants. So that is the potential benefit and value that I can see in the training academy concept. I support it, and I encourage your pursuit.

Thank you.

Senator SIMPSON. Commissioner Bernthal, did you have a brief statement?

STATEMENT OF FREDERICK M. BERNTHAL, COMMISSIONER, NUCLEAR REGULATORY COMMISSION

Mr. BERNTHAL. Mr. Chairman, I will just make a very brief comment. I will just note that we on the Commission, I think, have long sought some clear direction from Congress on matters of regulatory reform. A central element of that reform is the question of licensing the next generation of nuclear powerplants. It seems to me that the time has been long past, in fact, for the United States to join the rest of the world in improving standardized nuclear powerplant designs.

I don't believe it makes economic or regulatory sense to reinvent the wheel every time we try to license a nuclear powerplant. In fact, we have already licensed what are very close or could be very close to standard plant designs in this country, I suspect, unbeknownst to many of the public. For example, the combustion engineering plant at Palo Verde, General Electric's BWR-6 plant at Grand Gulf, and the Westinghouse SNUPPS plant and Callaway and more recently, at Wolf Creek in Kansas.

The Commission also, in finalizing its severe accident policy, has spoken, as well, on the procedure for improving standardized plants, the procedure, that is, of improving the standardized plants for the future.

I believe that each combined construction and operation license issued for such a plant should, on the day of issuance, carry with it the assurance that short of a new discovery in reaction safety, the NRC believes that plant to be suitable for a standard licensed lifetime of nuclear power generation.

This new legislation addresses early site review, standardized design approval, the regulatory framework for any backfitting required and for a streamlined hearing process. It is an attempt to ensure that both the hardware and regulatory benefits of standardization are realized.

I supported that legislation with one small exception, which is now being corrected, and I believe Commissioner Asselstine has already referred to that correction.

Mr. Chairman, I will withhold the rest of my comments and let us get on with the hearing.

Senator SIMPSON. I appreciate that very much.

Commissioner Zech.

STATEMENT OF LANDO W. ZECH, JR., COMMISSIONER, NUCLEAR REGULATORY COMMISSION

Mr. ZECH. I have a brief opening statement, Mr. Chairman, if I may. I believe there is a need, before construction starts, for the early resolution of as many site and design issues as possible with full public and governmental participation. The current two-step licensing process permits issuing a construction permit, that is, the first step in the process, with only about 15, usually less than 20 percent of design of the plant completed.

The current system then issues the operating license permit at a later stage, which, in my view, encourages involvement at a time that the plant is nearing completion and engineering operational readiness.

Thus, the present process itself can make possible holding a completed plant or essentially completed plant in limbo for unknown periods of time. I believe that legislation is needed to depart from the present two-step system.

I believe that the greatest contribution of this legislation would be for stability and predictability of the licensing process.

For a combined construction permit and operating license to work satisfactorily, we would have to have essentially the completed designs prior to the issuance of the license, and I think that is appropriate.

Standardization is a very important part of our legislation. Once the design and the site itself have been approved, there should be a high threshold, in my view, for opening up issues again.

The NRC, however, must continue to assure, as it does now, that the plant is ready to commence operation before it is allowed to do so.

If a member of the public or of a governmental body has a safety or environmental concern, they may raise it under the proposed system, as they can under the present system.

Our proposed bill would not change the full disclosure to the public of information concerning radiological, health, and safety risks. I believe that our legislation accomplishes these very desirable changes, and I respectfully request your support.

A brief statement concerning the training academy, Mr. Chairman, if I may. I recognize the critical contribution that training makes to the safe operation of the nuclear powerplants. Consequently, I support Senator Moynihan's bill, which would establish a national training academy. I believe, though, that more consideration needs to be given to how the Moynihan bill would be implemented and specifically to how education and basic training would be integrated with simulator and on-the-job training and even plant-specific training.

I believe, as does Senator Moynihan, that creating INPO was a most appropriate industry initiative.

I personally believe that INPO accreditation programs could be made to be complimentary to a national academy, and both could contribute to increased safety of nuclear plant operation.

Thank you, Mr. Chairman.

Senator SIMPSON. Thank you very much.

Before we get into further discussion of the NRC proposal, I would like to know what administrative steps the NRC has taken in the last 2 years, when you last testified to the subcommittee, on the licensing reform issue. What improvements have been made in the Commission's Licensing process in order to bring a greater discipline to that process?

Mr. PALLADINO. Mr. Chairman, I will relate the ones that come to mind. If I forget any, I will ask my colleagues to add to them.

I think when we testified last time, we already had the committee to review generic requirements, which is the very important discipline process for looking at requirements that apply to a number of plants. Since then, we have also been working on a backfit rule that would do several things: It would, place the responsibility for control of backfitting in the hands of the EDO, something we discovered seemed to be precluded by our present practices, if not in our regulations. It would also call for cost-benefit analyses on proposed backfits for specific plants unless, of course, the staff found an immediate need to apply the backfit to achieve a needed safety purpose.

Also, with regard to standardization, we have approved a severe accident policy. I think it goes a long way toward helping the staff to try to improve standardized plants that have been proposed.

We have also put out an advanced reactor policy.

We are working on a standardization policy to try to do as much as we possibly can administratively.

But one of the things we cannot do is mandate a combined CP/OL for an essentially complete design that has been reviewed. I think that is an important feature of the new bill. I think it plays a very important part in our standardization concept, because it is the incentive that I see that encourages standardization. So once a plant has received the CP/OL, then the greater restrictions we have on interference with that promise, I think, provides an important incentive. I think the opportunity for a hearing early on and for the public participation early on when changes can be made if proposals are really found to be deficient is a very important portion of the bill.

The requirement regarding any other hearing, I think are a reasonable stance for us to take, and I think the provisions that we have made in the bill are quite sensible and I don't think set up a thicket of obstacles that will interfere with public participation.

Mr. **Asselstine**. Mr. Chairman, can I make a couple of quick comments on a couple of other things the Chairman mentioned? There was a concern a few years ago about the management of the hearing process itself, I think, how long hearings took, whether the Boards were exercising control in managing the hearings themselves. I think a fair amount of progress has been made in that area over the past few years, and I think that, by and large, now our hearing process operates fairly efficiently and effectively. Hearings are conducted, I think, in a disciplined manner. Boards exercise a fair degree of control over the participants in the proceeding, and they are reaching resolution in a fairly reasonable time frame. In fact, we have not seen substantial delays, and issuance of operating licenses over the past few years bears that out.

Second, one of the other problems that we have had to deal with in the past few years is late allegations, concerns about quality of construction in particular plants very late in the process. That is particularly right when the Commission is preparing to make a licensing decision on the plant. That is another area where I think we have made some progress. The industry is due some credit in that area, too, because they have set up some programs to try and identify those concerns and have them resolved early on, before we get to the very latest stage of the process.

Some of our efforts in trying to verify the adequacy, quality and construction in a design before we get to the very last stage of licensing, I think, have helped, as well. One area where I think we haven't done as much as we need to, the Chairman mentioned it is an area we are going to be working on, is standardization. I think all of us agree that what we want from the standardization is to resolve all of the significant design issues for the plant before construction of the plant starts. We want to end this business that we have had in the past of designing and building the plant at the same time. We have known that is trouble, and that has just got to be ended.

One of the things that the Commission, I think, needs to do, in working with the industry, is to try and define what level of information we need in order to assure ourselves that we can resolve all those design issues and resolve them confidently prior to the start of plant construction. I think we have a good deal of work to do on that.

Senator **Simpson**. Thank you.

In our hearing on licensing reform in May 1983, the Commission endorsed the legislative proposal that provided for what amounted to an administrative resolution to the backfitting issue. I guess three things have happened since then: The Commission has changed its mind, apparently, and now endorses a statutorily prescribed backfitting standard. The Commission has debated its own backfitting rule for 2 years but has failed to take any final action, and the incident at Davis- Besse on June 9 took place, further confirming the lack of an orderly and disciplined process for handling backfits sufficiently and effectively.

Do not those three events point to some form of unwillingness on the part of the Commission to address the issue with the significant adverse safety and health consequences necessary to operation of at least one plant as a result?

Senator **Moynihan**. Mr. Chairman, would you allow me to amend your statement?

Senator **Simpson**. I would, indeed.

Senator **Moynihan**. We started out in the low power level in the plant in Long Island yesterday, and yesterday, we had a foulup. No radiation was released, but vents that were opened were closed and those that were closed should have been opened to four.

Senator **Simpson**. I amend my statement to four instead of three.

Mr. **Palladino**. Mr. Chairman, with regard to backfitting, we have a final rule nearly ready. I understood when I checked that there were three votes in, but one of them was Commissioner Roberts, so that will have to be reaffirmed. I think the three votes were consistent. When he comes back and reaffirms his vote, I would hope we can take the other two votes and complete our action. I think it is a very important addition.

However, in addition, the staff is already in the process of preparing to implement this rule, and they revised the manual chapter. We have already taken a lot of effort to train the people in the NRC on how to use it. I think that is a very important step.

With regard to the proposed legislation, there is a brief reference, but I think it also has to be backed up by a backfitting rule. I think the rule now under Commission review could very well serve that function.

With regard to the incident at Shoreham, I think it shows Senator Moynihan, the importance of preoperational testing before we begin these plants, get these plants up to significant power, because that is where we find out a fudge in the equipment, as we as efficiencies in the operation, and capability of the people that are running the plant.

I think it illustrates the point that was made about the suggestion that we not only have people that know how to operate the plant, but how the plant operates. I think we need people that know both, and I think that is one of the big problems that has existed on shift, because you may know how a plant operates, but unless you know how to make the plant operate, you can't come out necessarily with the solution for a particular circumstance. I think Davis-Besse illustrated that dramatically, because the people not only diagnosed what happened, they knew how to proceed to correct the situation.

Unfortunately, in the process, I think they complicated it. But that was, I think, in part because of the human factors aspect. They did a remarkable job of analyzing a very sticky situation and taking the steps to correct it and in a relatively short period of time. If I remember correctly, it was 12 minutes, and that is remarkable for a really complex situation.

Senator **Simpson**. Let me ask one other question and then go to Senator Moynihan. I was puzzled by the Commission's standard in 185-B of the proposed bill for appearing prior to the operation of a facility for which a combined construction permit and operating license has been issued. Would you just briefly explain to me the rationale for the good cause test there that begins at the bottom of page 7 of the bill and summarize how that differs from current law, and briefly give me the reason for that change as you proposed it?

Mr. PALLADINO. As you will recall, I believe Commissioner Asselstine highlighted it. First, there must be a substantial dispute of fact. The resolution of the issue is necessary for the Commission's decision, and it cannot be resolved without a hearing. Either the issue would not or could not have been dealt with earlier, or there must be some nonconformance, and the nonconformance must require corrective action. I think those are good cause and well stated criteria, because we don't want issues that have been settled to reappear in hearings. They must be issues that are material to the operation and that do require a hearing to settle a disputed fact.

Mr. ASSELSTINE. Mr. Chairman?

Senator SIMPSON. Yes, quickly, and then I will go to Senator Moynihan.

Mr. ASSELSTINE. My concern about this provision as outlined in my prepared statement is that when you add all of these things up, they do much more than I think what the Chairman described. I am all for saying that people ought to get one opportunity to raise an issue in these hearings and then that opportunity ought to be exercised at the earliest possible time. My problem with this standard is that I think that there are simply issues that you cannot raise prior to the preoperation stage. I don't think you can really resolve issues on emergency planning before you build the plant, nor can you resolve issues about whether the plant was built right before you build the plant; nor can you resolve issues concerning readiness for operation, whether the utility has operating staff on board that are properly trained and qualified to run the plant until the stage prior to plant operation.

Those issues simply cannot be resolved with precision prior to construction of the plant.

So there ought to be an opportunity to raise those issues prior to plant operation, and I think by saying that as long as the Commission can make a finding that the issue can be resolved without holding a hearing, what this does is basically say the hearing is discretionary on the part of the Commission.

I think that is wrong, that is a fundamental difference from our present process, and I think it is unfair.

Senator SIMPSON. Pat.

Senator MOYNIHAN. First, Mr. Chairman, may I thank the Commissioners and the Commission for their very thoughtful consideration of the bill that I have here and for their comments. Could I explain to the chairman something I haven't had a chance to do, and this, I think, might help the Commission also, how this came about in my thinking. It was very simple. In the aftermath of the Three Mile Island event, we had a big hearing, and the manager, the president of CEO was there and was telling us what he had thought had happened. I was a junior member of this body, still am, and by the time it came to ask a question, any question I could think to ask had been asked. So I did something almost at random. I asked the president of CEO, "How much money does the man who was in charge of that plant that night make a year?" It seemed a little bit like a Peter Sellers movie. The CEO man turned around and looked behind him and that man turned around and looked behind him and it went all the way back to the back of the room and it came back up. He made, something like $28,000 a year.

It occurred to me that we had a problem where management had taken the management techniques of the coal-fired/oil-fired generating plant using stationary engineers and so on, and just transferred them to this nuclear plant, which, as far as management was concerned, did the same thing. It produced electricity. They are in the business of selling it, not producing it. Keep on producing it; we can find people who will buy it.

At that time, I had in mind the old Oak Ridge School of Reactor Technology, which started up after the war. Admiral, I am sure you would remember it. It produced, in the Nation, a group of engineers and scientists who had a common experience of one place where they really learned their art, and they applied it in every possible which way. But if you have been to that school, you knew each other, and you knew you had information you could share. We were thinking of an academy well before INPO was established and watched it and approved it.

I hear you say that there is a shortage of persons at the advanced engineering stage in this spectrum. We learned, for example, Mr. Chairman, that in Great Britain that you have to be a graduate engineer to be on these shifts, and Bachelor of Sciences are not easily found in Great Britain. They don't graduate many people from colleges or universities, but on this, they say this is something new. First there is a shortage that you dealt with. Second, there is a need, as the chairman said, for people who really do understand this whole process and who might be able to design one of these things themselves if it came down to it. They could be part of a design team as well as an operating team. That is the first point.

Before asking if you don't agree, let me say, we are very open. The chairman is open. I am open, the Chairman may note members have been very kind. We do not have in mind setting up a group, a building, a lot of green lawns and attractive setting.

Obviously, this should be located at an existing university or a consortium of universities. This is not to be a new institution standing alone. It would be a mistake.

Do you not sense that this particular kind of advanced engineer that you need in this industry is not being produced right now in the numbers that you would need?

Mr. Bernthal.

Mr. BERNTHAL. Senator Moynihan, I didn't get a chance earlier to give you my thoughts on this subject, and I am encouraged that perhaps there is no difference or very little difference of opinion among the Commission based on what you have just said. I read your legislative proposal—with the presumption that you are proposing what would essentially be a self-contained Federal academy and you have given that a good deal of thought and other options are possible.

I endorse the principles that you have suggested in your bill, but I have felt that before the Commission endorsed the concept of a stand-alone, if you will, Academy of Nuclear Safety, that we ought to look at some of the alternatives, and in particular, it occurred to me that we ought to look carefully at the existing academic institutions and whether we can incorporate that kind of academic operation within some of the institutions. A few of them already have programs that are something of that type.

Memphis State University comes to mind. They have had a program of that type for some years. I would also suggest that—and I am not quite sure how this fits in, but I will toss the idea out—as you probably know, the State Department or at least members of the State Department have proposed an international academy.

Senator MOYNIHAN. Yes.

Mr. BERNTHAL. There may be some way that this concept could be worked in with this, as well.

Senator MOYNIHAN. That came up at our hearing. In particular, Dr. Canter, who was at Argonne and works with the IAEA was very much concerned about that.

Mr. BERNTHAL. Exactly.

Senator MOYNIHAN. If I could say, Mr. Chairman, just to be a bit of a propagandist here, in the United Nations, there aren't many enthusiasts for this these days. In Vienna, there is the International Atomic Energy Association. The security of the world depends on the quality of those inspectors. There aren't more than 40 of them, all Swedes, Danes, and Swiss. They have our lives in their hands. The idea of bringing people into this country for training, could I say, was also mentioned by a number of people that persons at the NRC could use this kind of training.

You have problems like that sometimes, finding people.

Mr. ASSELSTINE. I think there is no doubt about that, Senator Moynihan. One of the things that we have done in the past few years is dramatically increased our Resident Inspector Program which has people out at the plants. I think you get on the job experience there, and you get practical knowledge and understanding of what is really going on in the plants, something many of our Headquarter employees don't have. That, I would say, is the kind of thing we need in order to set practical knowledge and experience in motion.

Senator MOYNIHAN. I would like to say one last thing: That is it would be a mistake to put this in the NRC. The Department of Energy makes great sense as a sponsor, and it is well within the capacity of this country and this city together to think how to put it together.

Perhaps, Mr. Chairman, you could indulge us in some more hearings where people could come in and think out loud or maybe think a little bit ahead of time about how to do this.

It may be that we want a program for engineers, a program for high school level operators. But I am encouraged by these responses. Certainly, you could indulge us another hearing?

Senator SIMPSON. You are a very persuasive fellow. I think we could probably put one together. I would be glad to visit with you about that. I remember so well that hearing on Three Mile Island that you referred to. I was a junior member of the committee when that took place. My imagery is very clear. There we were, all thinking that those operators made $50 thousand a year because they were working with these machines. I remember that.

Mr. **Palladino**. Mr. Chairman, may I comment on what Senator Moynihan has just said?

Senator **Simpson**. Indeed.

Mr. **Palladino**. I think the school served a tremendous purpose. As a matter of fact, I had the privilege of being a participant in the precursor to the Oak Ridge School back in 1946. That school served a number of benefits, but one of the most important was to provide a cadre of people to go back into the universities and do further training. Then as the industry matured, other people were able to go to the universities, and in this Nation, we developed a significant, very well organized and very well qualified group of schools that were offering programs in nuclear engineering. I participated for 20 years in the Penn State Program. Penn State and a number of other schools, then, also went on to develop 2-year Associate degree programs at a college level, but it emphasizes more manipulative skills than analytical skills.

This has served as a good foundation for reactor operators.

The problem that came about is that as all the adverse publicity on nuclear power began to develop, students didn't flock to these programs, so they began to die out. As a matter of fact, we had a particular problem at Penn State with regard to the Associate Degree Program. We were faced with cancelling it for the following year because of a lack of people that were interested in it.

The head of the department went to see some of the utilities, and they were horrified that this was going to be dropped. So they put a few ads in the paper to develop a few stories, and we started that fall with the biggest classes we ever had. So the word has to get out. I do think that we have to cover quite a spectrum of activity, the manipulative skills, to understand the plant, and also, I think you made a very important point when you said we need to develop a broader and a more detailed base of knowledge on the part of the plant management.

There is one other aspect of training that I think we must not forget; that is, training for maintenance.

Senator **Moynihan**. Sure.

Mr. **Palladino**. Maintenance is very important in these plants. The plants, the main concerns are sometimes very difficult to get to. You can do the wrong thing because of the cramped situation if you are not well prepared. There is a question of mockups, and they have to be very plant specific.

Senator **Moynihan**. Thank you, gentlemen. Thank you.

Senator **Simpson**. May I say to the Commission, we will not keep you as long as Chairman Markey yesterday.

I see you chuckle lightly, it is a pleasant place here, isn't it?

It certainly is. We try to, in a sweet way, with not a camera here.

Mr. **Palladino**. Mr. Chairman, I hesitate to agree with you, because whatever I say may be used against me.

Senator **Simpson**. I am going to submit some written questions. There may be some additional questions by the ranking member, Senator Hart, and so the record will remain open for a short time for those.

I thank you very much, and we will pursue this dual activity of licensing reform and the training. I think they fit well in many ways. So I thank you and appreciate your being here today.

Mr. PALLADINO. Thank you, sir.

Senator SIMPSON. I have a commitment I cannot escape later, so, to save a little time, if we could combine panels 2 and 5 at this time, if those five individuals would come forward, the vendors and the architect engineers.

If you can clear the room as soon as possible, I would appreciate it. Mr. Wolfe, you have a time problem, do you not?

Mr. WOLFE. Yes, I do.

Senator SIMPSON. I am going to change everything a bit. We have at the table James S. Moore, vice president of Westinghouse Corp.; Dr. Shelby Brewer, here in a different capacity than past, now vice president of Combustion Engineering; and Dr. Bertram Wolfe, vice president of General Electric Corp. The other panel, James T. Ramey, vice president, Stone & Webster Engineering, and W. Kenneth David, consultant to the Bechtel Power Corp.

I am going to go right to you, Mr. Wolfe. You have a serious time problem, go right ahead, sir.

Can we have order, please, in the room? If you want to converse, do it out in the hall. Please? Thank you.

STATEMENT OF BERTRAM WOLFE, VICE PRESIDENT, GENERAL ELECTRIC CORP.

Mr. WOLFE. Senator Simpson, I want to thank you for your courtesy. I want to indicate that this is the second time I have come to Washington for this important hearing. I make that point just to indicate the importance that I and the company place on the issues before the committee today.

As you indicated, and I told you, I do have a very serious time problem. I have asked Mr. Glen Sherwood, who is in charge of our licensing, to replace me here when I have to leave in order to respond to questions.

Let me start by indicating that the present system of licensing, in my view, is totally unpredictable, and it is basically bankrupt. Despite the comments that you heard before—and we do appreciate the attempts by the Commission and the Commission staff to improve the present system—I think it is fair to say that if you were to ask any of the Commissioners to predict whether a new plant proposed that was identical to the one that had started up yesterday could be licensed in a predictable time, you would not find any, who would be able to give you a predictable time for that license.

Yet abroad, we find that organizations using the U.S. technology, and in effect, building plants that are identical to plants we build here, are able to put those plants on the line in a predictable period; and the plants operate as well or better than the plants in the United States, and certainly have as high safety standards.

In Japan, the Japanese are able to put plants on the line equivalent to our BWR-5's. They put those plants on in 5 years on difficult sites, in 4 years at more easy sites, and they schedule them and they meet their schedules.

In Taiwan, the Bechtel Co. and General Electric, working with Tai Power, were able to build a BWR-6 in 60 months from the time of first site work, whereas in the United States, it takes us 12 to 15 years to put the same basic plant up; and that plant I am referring to—the same companies are working on it in Mississippi—is Grand Gulf.

Clearly, the licensing system and the regulatory system require reform. I have submitted for the record a prepared statement on the need for reform, and in the interest of time, I also would like to submit for the record the additional statement I was going to make, which I will now cut down substantially for timing purposes. So I would like to submit that for the record if it is all right.

Senator SIMPSON. Without objection, so ordered.

Mr. WOLFE. I have submitted this statement and a second one on our view of reform of the licensing process, as well as General Electric's views on what meaningful reform legislation must include. Such legislation, in our view, should have five objectives: First, it should make the process more predictable; it should further increase the assurance of safety of plants being designed and built; it should improve the quality of regulatory decisions; it should reduce unnecessary costs, and it should promote the more effective public participation in the process.

A key element of any reform proposal which furthers all five of these important policy objectives is standardization. We believe that the three bills before Congress, the NRC, DOE, and the Broyhill-Moorhead bill, which has not yet been submitted to the Senate, contain the essential elements of authority for granting standardized design improvements.

These bills do provide for standard design approvals, for the provisional issuance of a combined construction and operating license, assurance of stability of approvals once issued and authority for granting early site permits. We think all of these are essential elements to a new workable licensing method.

Among the last of your written questions were those about differences in the bills. In my written testimony, and I have outlined in some detail the differences between these various bills. I might say that they are more similar than disparate, but they do have some differences. We cover them in our formal statement.

Let me briefly note two of the differences here: The NRC and the DOE bills, but not the Broyhill-Moorhead bill, contain what we believe are highly desirable provisions requiring that all inspections, tests, analyses, and acceptance criteria should be specified in a single-stage license, so that when the plant is built and as it is built and after it is built, the acceptance criteria will be known.

On the other hand, the Broyhill-Moorhead bill and the DOE bill, but not the NRC bill, contain what we believe is an important provision requiring that amendments to design approvals be made only in separate proceedings to amend design approvals, not in individual licensing procedures.

While, as I indicated, there is a remarkable consensus among all three bills on the basic concepts, and all would significantly improve the existing licensing process. The ultimate legislation, we believe, should include both of the above provisions.

I see the red light there, Mr. Simpson.

Senator SIMPSON. That is for your plane.

Mr. WOLFE. That is for my plane.

Senator SIMPSON. It is leaving.

Mr. WOLFE. In view of the courtesy, I will respond by ending here and thank you very much for that courtesy and indicate Mr. Sherwood will be available to answer questions if I have to leave.

Senator SIMPSON. I have that note. I appreciate that very much. Mr. Moore, please.

STATEMENT OF JAMES MOORE, VICE PRESIDENT, WESTINGHOUSE ELECTRIC CORP.

Mr. MOORE. Thank you, Mr. Chairman. I would like to also express our thanks for the opportunity to express our views on your proposed legislation to modify the licensing process.

I would like to introduce my prepared statement for the record and offer a few brief comments.

Senator SIMPSON. Without objection.

Mr. MOORE. Since I last testified before this committee about 2 years ago, electrical energy consumption has increased 9 percent. The utilities are seriously questioning their decisions to avoid building additional generating capacity. As this need for new generating capacity becomes clear, the future of the U.S. nuclear option becomes even more vital. Regulatory uncertainties must be addressed to take advantage of that technology.

Based on our experience in plant construction, we believe that discipline is needed in all phases of the construction and licensing process on the part of all of the participants, the industry, the NRC, and interested members of the public. The proposed legislation will foster that discipline and provide the certainty and stability now lacking in the licensing process. Historically, the United States has been a world leader in the nuclear technology. The NRC and its predecessors have been the leader in setting safety standards and criteria. U.S. regulatory requirements were adopted virtually verbatim worldwide during the emergence of nuclear power.

But while everyone essentially integrated our regulatory requirements into their own regulatory system, interestingly, they did not adopt the U.S. licensing process. Most countries developed their own, and today, their processes appear to be more efficient than ours. Consequently, overseas, we can still build and license nuclear plants with safety standards as high as the NRC's in only 6 to 8 years.

At present, we see the regulatory agencies in many other countries using not only their own regulatory process, but are now also questioning, and in some cases, rejecting new NRC regulations. Our joint program with the Japanese to design a simpler, more inherently safe reactor is an example of how pervasive this problem has become internationally.

The advanced pressurizer reactor under development is being designed to meet the regulatory requirements of Japan, not those of the United States.

We also need to compete successfully in the international market to ensure our ability to respond when a domestic market returns, as I am certain it will. Some action by Congress is needed to provide the needed reforms in the regulatory process. This will give a strong signal to the international nuclear community that the United States intends to continue to be a reliable supplier of nuclear powerplants, with services, and to continue its technological and regulatory leadership.

At this point, I would like to briefly discuss our views on each of the provisions of the legislative proposals, but not every provision in detail.

It is important to recognize, however, that all of these provisions together form an overall approach to the regulatory process, and improving the process depends on the combined effects of the provisions taken as a whole. Preapproved plant designs in standardization, particularly if utilized with preapproved sites and protected from unnecessary backfitting, have the potential to greatly reduce the cost and time required to bring nuclear powerplants on line.

Their benefit to utilities, consumers and the nuclear industry are clear. Standardization, however, should not mean that there cannot be continuing plant improvements. However, once regulatory approval has been obtained for some design or activity, there is a strong disinclination to do anything to upset that approval and require re-review. The more cumbersome and uncertain the regulatory process, the greater is the disincentive for technological advances. On this basis alone, we believe that the regulatory reforms being proposed have considerable potential for fostering improvements.

An important feature of the license reform proposed by both the NRC and DOE has a provision for one-step licensing. I would like to especially emphasize the relationship between standardization and one-step licensing.

The proposed legislation provides for standardization in its provision for preapproval of designs. For preapproval or standardization to be effective, however, it should be coupled with the one-step licensing process. A complete review with meaningful public participation should be required at the front end of the process. Thereafter, the benefits of standardization accrue only if the license constitutes approval to construct and operate the plant.

Although the current process provides two opportunities for public hearing, it foreshorters public participation in preparing the one-step format, it really occurs too soon now, because there is not adequate design identified, and the operating license is too late, since it takes place after the plant is almost entirely constructed.

I believe the industry is willing to undertake the considerable expense of submitting a more detailed design earlier in the process if it can be assured that the regulatory review would be meaningful.

For the reasons I have stated in these oral comments and my written comments, we support both the NRC and DOE proposals with the changes that are recommended by the AIF, and you will hear later testimony today.

We respectfully urge you on this committee to recommend these proposed changes to the full committee and the Senate and to use your good offices to work for the passage of this into law.

Thank you very much for the opportunity.

Senator SIMPSON. Thank you very much. I appreciate that.

Now Dr. Shelby Brewer.

STATEMENT OF SHELBY BREWER, VICE PRESIDENT, COMBUSTION ENGINEERING, INC.

Mr. **Brewer**. Thank you, Mr. Chairman.

I know you are pressed for time this afternoon, so I will be very brief and confine my remarks to addressing a central major issue in licensing reform, and that is, the balance of interest between protection of investment and protection of a crucial energy option for the future on the one hand and on the other, in the protection of public health and safety.

These objectives are not mutually exclusive. The proposed legislation serves both of these objectives—it serves all societal interests. The public health and safety goal is served first of all by focusing the Nation's technical resources, both the technical resources in industry and in the regulatory body; concentrating those resources on fewer standardized designs for plants or subsystems as opposed to squandering those resources on a plethora of custom designs.

Public health and safety are also served by this bill through more effective public participation early in the process before major financial resources are committed, and public participation with essentially complete designs and site proposals in hand.

Finally, public health and safety is served by a more disciplined, systematic review of retrofit proposals to assure that net overall plant safety is enhanced, not degraded by such proposals, and that the sheer accumulation of retrofits does not, itself, result in safety degradation, as some, even among the regulators, have implied.

Do we need licensing reform now in the absence of nuclear plant orders? I believe that Congress should make use of the lull in the NRC caseload to perfect the licensing and regulatory process rather than wait for a future in which pressures constrain reason or worse, a future when remobilization of nuclear energy is no longer an alternative. Your efforts, therefore, Mr. Chairman, to craft intelligent legislation deliberately and carefully are very timely.

The major outlines of the bills before Congress now are quite similar. They have converged over the past several years since the 1983 Reagan administration bill, to a set of bills which should be able to be marked up rather expeditiously and perhaps enacted in this session of Congress.

Thank you very much, Mr. Chairman.

Senator **Simpson**. Thank you very much. I appreciate that.

Now, please, Mr. Ramey.

STATEMENT OF JAMES T. RAMEY, VICE PRESIDENT, STONE AND WEBSTER ENGINEERING

Mr. **Ramey**. Mr. Chairman and members of the committee, I would like to submit my complete statement for the record.

Senator **Simpson**. It is so ordered.

Mr. **Ramey**. In the several minutes allotted to me, I would like to make the following points: Standardization and related legislative measures are needed to provide a stable and systematic and efficient process for regulating the nuclear power industry.

This process, in turn, should result in improved safety in design, construction, and operations of nuclear powerplants. As the licensing process becomes more stabilized, the utility industry, the financial community and the public will gain more confidence in the viability of nuclear power, and even with modest economic growth, orders for nuclear plants should begin again.

We know that economic growth has proceeded.

Two, more specifically, standardization and related measures are needed to provide the discipline required of the NRC, the utilities and their contractors and labor, that once a plant design has been approved, the plant can be constructed and operated on schedule without the myriad and undisciplined changes and backfits which have occurred in the past 10 or 15 years.

As an AEC Commissioner back in the late sixties and early seventies, I sponsored the AEC's first policy on standardization, and its first and only antibackfitting requirements.

As you know, some progress was made in the seventies in regard to standardization, but the backfit rule has been ignored until very recently.

The NRC and DOE bills, as presently drafted, are a considerable improvement over their predecessors and take into account suggestions made by Congress, the public and industry. In general, we prefer the DOE version, because it provides more definitive requirements and criteria governing NRC actions.

For example, on backfitting, the DOE bill requires the NRC "to establish a centralized systematic and documented review process to evaluate and consider a proposed change."

In conclusion, I would point out that the first comprehensive licensing reform legislation was proposed by the AEC in 1971. Something called the Calvert Cliffs case seemed to get in the way of serious consideration of this legislation in 1971 and 1972. In 1973 and 1974, the Price-Anderson Act Extension took priority over licensing reform. In 1978, the Carter administration did not seem able to generate much enthusiasm for reform.

In the past few years, the nuclear high level waste legislation received priority. I would hope that consideration of the Price-Anderson Extension, important that it is and is before your committee, will not preempt consideration of standardization legislation and action on it, as well, in this Congress.

Thank you, Mr. Chairman.

Senator **Simpson**. Thank you very much.

And now, please, Mr. Davis.

STATEMENT OF W. KENNETH DAVIS, CONSULTANT, BECHTEL POWER CORP.

Mr. **Davis**. Thank you, Mr. Chairman.

It is a pleasure to be here, given in a somewhat different capacity, and have the opportunity to present Bechtel's views and my own on the subject of licensing nuclear plants. I have furnished copies of my prepared testimony and request that it be incorporated in the record of the hearing.

Senator **Simpson**. Without objection.

Mr. DAVIS. I would like to summarize some of the key points from my testimony, which is primarily aimed at the licensing of new nuclear powerplants.

Our first major point and one which you have already referred to, Mr. Chairman, is that it is really urgent to reform the nuclear licensing process in anticipation of decisions by electric utilities during the next few years with respect to additions to base load generating capacity.

The North American Electric Reliability Council recently reported that plant additions for electric generating capacity through 1994 will support a 2.2 percent annual increase in peak demand and then only if all nuclear powerplants now under construction are completed, as well as all planned fossil units, some of which have not yet been ordered.

During the 10-year period 1974 to 1983, the GNP only grew at a rate of 2 percent per year, while the electric power use increased by 2.3 percent per year. The current economic projections contemplate GNP growth rates of 3 to 4 percent a year. This, in conjunction with long lead times for required planning, licensing, and construction indicates it would be prudent for new contracts to be entered into soon, in 1 or 2 years in some areas of the United States.

If nuclear power is to be considered, it is necessary but not a sufficient condition that the licensing process be more certain, less complex and more orderly. It is critical, in our view, that it be adapted to ordering new units which are virtually identical to units licensed, built and operating well today since, in our opinion, these are the units most likely to be ordered by the utilities, at least at first.

Commissioner Bernthal commented about this where he referred to the Palo Verde and SNUPPS units.

We are very much in favor of standardization and indeed have been seeking ways to accomplish this by way of a generic approach involving standardized systems and modules. The SNUPPS project was a milestone in this effort. However, we have found that considerable flexibility is required because of the two major limitations on standardization: Site-specific requirements and the need to preserve competition.

However, the basic portions of a plant, those directly related to reactor safety, can be standardized more than they are today with sufficient flexibility to accommodate the competition needed. This can most easily be done with modules and systems which can be assembled into a complete plant design but which individually can allow for alternatives to supply the physical systems and components.

The overall plant design must reflect the site conditions, but most of these have little bearing on safety and again, are viewed as variations from a referenced, standardized design.

Those significant, such as the seismic requirement, can be treated in classes.

As indicated, we believe that the natural course of events will lead to the use of existing plants as reference designs which can then evolve into a series of standardized designs. However, whatever system is set up should accommodate not only this scenario, but the eventual use of new designs, advanced reactors, restart of some plants now deferred and duplication of units already in operation on an existing site.

We feel it is appropriate to establish the concept of standardization by legislation but do not believe it can be confined in a technical sense by legislation. The procedures, criteria, and the uses of standardized designs in terms of an operating definition can be established by law. However, actual implementation must be left to the responsible and informed judgment of the Nuclear Regulatory Commission.

In summary, we are supportive of legislation establishing the standardization concept, if coupled with procedures and requirements which will at the same time simplify the overall licensing process and make it more predictable. Without this, there are not likely to be new orders for nuclear powerplants in the foreseeable future. Second, we support measures for preapproval of sites for nuclear powerplants. Third, we support the concepts of phased approval of quality assurance in construction. Fourth, we believe a combined construction and operating license procedure is essential and compatible with the way we believe new orders will be initiated and the evolution of standardized plants.

Fifth, we believe that measures to constrain backfitting are very important and again, are complimentary to the standardization concept.

Sixth, we favor the reorganization of the Nuclear Regulatory Commission to provide for an administrator appointed by the President.

That is the conclusion of my remarks, Mr. Chairman.

Senator SIMPSON. Thank you all very much.

A question of particular interest to me is the issue of how we, in the Congress, are going to define the level of design detail that we would wish to see in the standardization of design, the second-by-second analysis of the bill talks about "substantially complete" design information. Jim Asselstine refers to "essentially complete" design.

How do we strike a proper balance between achieving much greater design information than we now seem to get from the utilities with a need to ensure that the vendors and the architect, engineers have sufficient flexibility to tailor a design for a site that is selected conscientiously by a controller?

Please, Mr. Moore?

Mr. MOORE. I will take it first. I think as has been described here and you point out, that is one of the difficulties in the standardization process.

Philosophically, the way we look at it is to have a sufficient amount of design detail to where you have defined the safety parameters and you have defined the specifications for the systems and the system's performance, you have identified components that go in those systems. You can identify the tests, inspections, analyses, et cetera, that have to take place in the process of constructing, checking out, putting into operation the systems.

In the reference reactor, that kind of thing was up to the point where we have equipment specifications sufficient to go out and order a component, order a particular pump or a valve or a heat exchange or et cetera. We have all that design detail done. There still remains detailed design for the site, particularly in the nonsafety area, detailed wiring diagrams, and so forth.

But we have defined the specific systems and their basic configurations and all the requirements that have to be met in the process of building a plant for the NRC we then can together be held to. That is a sufficient investment. This is a sufficient investment for the utility and ourselves.

Senator SIMPSON. Yes, Dr. Brewer?

Mr. BREWER. Mr. Chairman, I would associate my remarks with those of Mr. Moore. I would like to point out, however, that we, in fact, already have a standard design in Combustion Engineering, and we have, in fact, licensed that design or licensed a plant with that design by reference.

The design is that of the Palo Verde plant, the System-80. It would be amenable to other sites. A balance of plant considerations might have to be refined for other sites and other environments, other water conditions, and so forth.

But it is a standard design, and it exists and it has been approved by NRC in total detail. Palo Verde No. 1, a plant erected to this standard design, has been licensed and is operating. And there are two other identical units, Palo Verde No. 2 and No. 3, right beside it. This is the only standard plant in the United States. Combustion Engineering's standard system is not a promise but a reality.

Senator SIMPSON. Could you briefly give some examples of where design flexibility is necessary as a result of site-specific direction?

Mr. SHERWOOD. I might also answer that but also that General Electric has a design which I think you know about called a GESSAR. It is unique and contains an entire building from the point of view of at least a radiological significant building. It does not include the turbine building and a few others. It is an example of a standard design. I think our next standard design which we would contemplate doing would be to depart slightly from the current one that we feel would provide far too much information, and let's say, in the control area. Our control volume is a thousand pages thick. It gives pin connections for every single component we provide in the building. It really isn't necessary.

In addition, since our plant had its rootes in several TVA plants, we provide some information on specific pumps, and were we to do that from scratch or provide, as Mr. Moore said, more generic information on specifications and an outline of how that pump would operate.

I think we, the vendors, generally agree that what is needed is a full design, but it can't be so restrictive that it precludes certain pump manufacturers from playing in the game.

Also, we don't want to go so far as to get involved in that whole second set of things called construction drawing phase, which is totally different from licensing.

Senator SIMPSON. Yes, Mr. Ramey?

Mr. RAMEY. I think the designs of the plants referred to were done under the NRC's system of having a preliminary standardized design approved. This was A&C's and NRC's policy in the seventies and goes on into the eighties.

I think what we are referring to now in terms of a standardized design would have more detail than in such a preliminary design, but less than in what the NRC would define now as a final design. The latter would go almost to, and sometimes does, down to a name plate, a specific named component, for example.

So that what you would have to have under the proposed legislation would be criteria and specifications, including performance specifications, to such a degree that competitive proposals could be obtained on large equipment and components.

Senator SIMPSON. Yes, Mr. Davis?

Mr. DAVIS. You inquired about the site-specific factors, and I did have a list of them in my testimony. Can I run over them briefly. Ones we identified were: site geology and local meteorology; foundation requirements for design; site design criteria; flood protection design; fresh versus saltwater systems; open cycle versus closed cycle cooling; cooling water materials of construction; water purification systems; the orientation of water intake and discharge structures; powerlines and switchyards; transport facilities, railroads, docks, roads; electrical requirements to the system being served; other weather conditions.

There are a host of others. These are where the problem occurs in trying to take what basically is a standardized nuclear steam supply system and the balance of plant systems and incorporate them into an overall plant design, which is the job of the engineering constructors.

We think this can be done by using modules, some modules might work with Combustion Engineering plants, some with General Electric, some with Westinghouse, to provide the necessary alternatives there. We think it is quite reasonable to utilize, particularly based on existing operating plant experience, the complete designs that are available, modified for the specific requirements of a particular site, most of which inherently do not have much impact on safety and could be reviewed quickly to make sure that they don't.

The seismic design requirements is the rather outstanding one which would have to be treated differently.

Mr. SHERWOOD. This means our plant is designed for 90 percent of the sites in the United States, taking that entire list of the reference envelope. So that 90 percent, of course, excluded the worst areas in the seismic. But on the other hand, it beefs up the plant pretty much so that it penalizes, as it were, an individual who wants to build a plant, let's say, up in Missour or in Long Island, where they haven't have too many earthquakes.

So it is a tricky design problem between the vendor and the architect engineer in terms of how to make that standard design fit all for a reasonable price.

Senator SIMPSON. I think it is a benefit that many people don't know; really, in a sense, there is a standardized design process going on now. All of you, I gather, to varying degrees, are pursuing standardized designs, either in this country or abroad under current processes. That was known to me when I got into this issue. But I don't think it is recognized by the public, and then there have been so many problems that plagued the first generation of nuclear reactors, and that can be traced to quality assurance and the things that come from design and all of the things that we have put together in these various hearings.

Again, our issue is still the same. We cannot lose sight of what that is, and that is, how do we restore public confidence that these plants can be built and operated safely? That is really the issue. That is what we must express. That is the NRC's function. That is the vendor's function, the architect-engineer, Congress function.

The goal of restoring the public confidence, doesn't that come closer to reality when we deal with a more uniform standardized smaller facility?

Mr. MOORE. I think the public goal is certainly of increasing their understanding and the credibility of our industry. It is well served by having a process where we can sit down in a public forum, a public hearing, with a fairly specific definition of what it is we are intending to build and how we are going to build it, and let them have every shot at that design, at that site, at that emergency plan, whatever, at that point in the design process.

I think the public, then, should be better served by having their opportunity across the board with a very specific design, and I would point out, in all of our cases, designs that have been built up on all the experience we have had in the last 25 years in this industry. There is a great wealth of operating experience that did not exist when we first started with this business.

Our ability to show the public what are the lessons learned and how is this incorporated in the design, in this kind of a preapproved process, I believe, goes a long way to improving our credibility.

Senator SIMPSON. Mr. Davis, please.

I will ask each of you to respond.

Mr. DAVIS. I would like to go back to the point that I made earlier. I think this is exactly the reason that we feel that first new orders will probably be based on existing, operating plants. This minimizes the risk to the utility and should provide the maximum confidence for the public and the regulatory people that, in fact, you have got something you can look at that runs and runs well, and it requires a minimum in design changes, even to accommodate it for a new site.

This is why we think this is the way things are likely to go.

Senator SIMPSON. Yes.

Mr. SHERWOOD. I think and we believe that a number of things are required to give the people credibility with regard to nuclear power. One is that the plants are run right. Nothing we can do can solve the problem if that doesn't happen. We think that happens in what the utilities are doing, not only with themselves, but INPO, NUMARC, and so forth.

I think the second thing is that the utilities not order too many new plants that are not necessary and create another fiscal crisis. I think we all agree that is not likely to happen again with the experience we have had. I think third, the reactor manufacturers and architects and NRC and Federal Government need to show some leadership to establish a new licensing process that would give the people, and particularly the utility owner, some confidence that there can be a new, better way to do things in the future. I think that has to be initiated by the Congress. I think it is just too much for any one of the other pieces to be handled by themselves.

Mr. **Brewer**. Thank you, Mr. Chairman.

I think the provisions for standardization will help public confidence in that it will underscore the fact that we are not tinkering any more; we are not experimenting any more, we know what we are doing, and we will do it repeatedly.

Second, as I recall, the proposed legislation might, in fact, call for three public hearings: one for the site, one for the design, and the third for the combined construction and operating license [COL]. The current process calls for only two hearings, one at the operating license stage and the other at the construction permit stage. So we, in fact, have more opportunity for the public to participate in the proposed ligislation than in the existing system.

Senator **Simpson**. Yes, Mr. Ramey?

Mr. **Ramey**. I would endorse these other statements and point out in addition on the public confidence aspect that the research done in the last several years on what is called the source term, the amount of radioactivity that might escape in the unlikely event of an accident has shown that the hazard is essentially a good deal less than it has been estimated.

This should, in turn, help out on the emergency planning aspects initially in looking at a combined construction and operating license.

Senator **Simpson**. That is very true. I have been looking at that, especially with regard to Shoreham. It did have some impact, I am sure, on that decision. All of us will be interested in the results of the recent tests in Idaho which was directed rather specifically at that. I will be very interested when they compile that.

I thank you very much. You have been very helpful.

Mr. **Sherwood**. Mr. Chairman, might I have one moment to bring up another item?

Senator **Simpson**. With me?

Mr. **Sherwood**. Dr. Wolfe asked me to clarify the situation at Shoreham that was alluded to by the Senator from New York.

Senator **Simpson**. Here is your chance.

Mr. **Sherwood**. That situation was very innocuous. Apparently, there was a test wherein a valve and a container was supposed to be open, a 4-inch valve, and someone opened an 18-inch valve inadvertently. There was no escape, there was no radiation. It was closed in 2 hours, which is much less than the time stated.

Senator **Simpson**. If that was innocuous, than that is the first time anything connected with Shoreham has been innocuous in my experience.

Mr. **Sherwood**. Thank you.

Senator **Simpson**. Thank you for that clarification. Thank you for your testimony.

Now, Mr. Vaughan, please, the Acting Assistant Secretary for Nuclear Energy at the U.S. Department of Energy. Please proceed.

STATEMENT OF JAMES W. VAUGHAN, ACTING ASSISTANT SECRETARY FOR NUCLEAR ENERGY, DEPARTMENT OF ENERGY, ACCOMPANIED BY WILLIAM H. MELLOR, DEPUTY GENERAL COUNSEL FOR LEGISLATION AND REGULATIONS

Mr. VAUGHAN. Mr. Chairman, it is indeed a pleasure to be here today to discuss the critical need for reform of our nuclear licensing and regulatory processes. I have with me at the table this afternoon the Department's Deputy General Counsel for Legislation and Regulations, William H. Mellor, who was a key player in drafting the administration's legislative proposal and who will assist me in responding to your questions.

I think in the interest of time I will summarize my remarks and ask that my complete statement be included in the record.

Senator SIMPSON. Without objection.

Mr. VAUGHAN. I would note that since we have deferred this hearing, my complete statement does include the Department's comments on education and training of nuclear powerplant personnel in response to the concerns of Senator Moynihan's bill.

Senator SIMPSON. Good.

Mr. VAUGHAN. I would simply note, Mr. Chairman, as was brought out earlier today, that as we continue our discussion of that proposal we should distinguish between the subjects of education and training, which do have some distinct different features. We would be pleased to assist in helping formulate some plans which meet both of those somewhat separate, but related, objectives.

The administration's legislative proposal to reform the nuclear licensing and regulatory processes, the Nuclear Facility Standardization Act of 1985, was forwarded to the Senate on May 7, 1985, and has been introduced separately in the House as House Resolution 2488. In our view, the administration's proposal encompasses the key features of the NRC bill as well as those of a bill previously introduced by Representative Broyhill in the House which I understand now has about 60 cosponsors.

The Department regards the enactment of licensing reform legislation during this session of Congress to be a matter of very high priority. It has broad and strong support as a key part of our efforts to assure the continued viability of the nuclear power option.

Therefore, before discussing the principles and provisions in the administration's legislative proposal, I would like to very briefly discuss this subject in the context of the need for nuclear power in our Nation's energy future.

The nuclear regulatory process that we seek is a key factor in supporting the administration's policy of energy stability, security, and strength. Nuclear power is a key energy supply source, and is critical to maintaining a balanced and mixed energy resource base using our indigenous resources. It contributes an important dimension to national security and to our efforts to be free from dependence on foreign energy sources.

The nuclear power option needs to be available for America's future. As we all know, there are numerous interrelated reasons for the current hiatus in new utility commitment to nuclear power.

It is very clear that the complex and unpredictable licensing and regulatory process is a prime contributor to construction delays, increased costs, and decreased public acceptance of nuclear power. Our efforts to reform the current licensing regulatory processes should be directed at remedying this situation.

We must do it now, so that nuclear power will be a viable option for new generating capacity with reasonable and predictable leadtimes as a choice in the marketplace.

Against this background, I would like to discuss what we in the Department view as the three goals of any licensing and regulatory reform initiative: First, to continue to assure public health and safety; second, to continue to assure the effectiveness of public participation, and third, to restore stability and predictability to the processes of licensing, regulating, constructing, and operating nuclear powerplants.

Legislation should remove federally created disincentives and unnecessary roadblocks to the development and deployment of nuclear power. This action will allow utilities again to consider the option of nuclear power on its clear economic and environmental merits.

To realize these goals, legislation should include four key features, all of which are embodied in the Department's legislative proposal: First, early approval of standardized designs or preapproved fixed designs, as may be a more appropriate term, and the concomitant ability to make early, firm decisions should not only enhance plant safety performance, but also improve the economics of nuclear power as well.

The NRC would be authorized to approve standard designs for entire plants or for major subsystems of those plants, so that utilities would have the option of choosing a basic plant of preapproved design in lieu of a one of a kind of customized plant design. Prior to approval, an opportunity for public hearings would be offered. If approved, the design should remain valid for 10 years and be eligible for renewal.

Second, early site approval will reduce the complexity of the process and permit early, firm decisions, including the opportunities for public participation. The NRC would be authorized to approve sites for prospective nuclear plants in advance of the utility's decision to apply for a construction permit.

The site permit would likewise remain valid for 10 years and be eligible for renewal.

Senator SIMPSON. I am sorry. I must ask you to summarize. Your 5 minutes has expired.

Mr. VAUGHAN. Let me briefly complete my comments.

Senator SIMPSON. I appreciate that.

Mr. VAUGHAN. Third, the combined issuance of a construction and operating license is critical to stability and predictability in the process. Again, public issues can be raised at an early stage, fully aired, and settled in a manner that is not disruptive to plant construction and operation.

It is important that we have a combined construction and operating permit as a single step. NDC inspectors would then be permitted to approve major systems or tests as they are completed in order to avoid reopening old issues at the end of construction.

There would be an opportunity for a hearing prior to the issuance of the operating license if, on request by any person following completion of construction prior to plant operation, it could be done under realistic criteria which we have outlined in our proposed bill.

However, there should be no provision that allows previously settled or nonsafety or recordkeeping issues to be brought up to merely intervene in the plant's operation.

Senator SIMPSON. I really would appreciate it. I am not trying to be rude. I want to hear the rest of the witnesses, and I want to hear what they say, and I want to be here. I am going to have to leave here soon.

Mr. VAUGHAN. Senator, there is simply one last point, which is the fourth key element in the bill. A more disciplined process is needed for approving design modifications to correct the so-called backfit problem. This process has lacked discipline. Numerous means for making changes have been employed, and it can be remedied by a disciplined, centralized control process with careful definitions of the criteria for which changes need to be made. I will conclude my remarks at this point in order to respond to your questions.

Senator SIMPSON. I would like to ask a question.

On the backfitting issue, which you just described, DOE has recommended a statutory backfitting provision in the interest of "long-term policy, stability, and predictability." Would you please respond to those who take the view that we are very limited in backfitting and want more flexibility than the statutory provision or standards would provide?

Give us your views on what the results would have been in our 6-year experience with the auxiliary feed water system backfitted at Davis-Besse and a provision like that that is in the DOE bill were it on the books.

Mr. VAUGHAN. Yes. I think we have struck a balance between those two concerns by avoiding being completely prescriptive in what should be included in the backfitting process, but rather, to require that the process be controlled, disciplined, and have centralized high level management review. If we look at the Davis-Besse situation, as I understand it, there are at least two aspects that are of interest: One is the adequacy of the original design, and two is that the process has taken a long time to determine what design changes would be made. I believe the provisions in our bill, if they had been in place, would have first initially focused the view of the single generation of plants, that is, a standard fixed design, and so hopefully, we would have avoided the problem in the first place.

In the second place, if there had been a series of standard uniform plants and problems had occurred, I believe that the disciplined centralized view which we have recommended would have forced the changes to be made to all of the plants if, in fact, the deficiencies had truly been safety-related.

Senator SIMPSON. Let me just ask you one last question. I must submit the rest to you in writing. I wonder if you could just comment briefly for me on what you see in the nuclear programs of other countries and whether their successes of design and operation of nuclear powerplants are really translatable to this country.

Mr. VAUGHAN. I believe they are, Senator Simpson.

As you know, they have largely taken technology that was an American invention and done better with it, adapting basically our original designs. For example, in both France and Japan, where I have visited and where they have been very successful with the plants, they reach full consensus on the design and the site, and then they proceed to build the plant without interruption; if the plant is built in accordance with specifications, they then proceed to operate without delay and without reopening hearings, providing that the regulatory authority has properly overseen it.

These are exactly the elements that are included in our proposed legislation, are directly translatable to the United States and could cut the current 12- to 14-year construction time in half.

Senator SIMPSON. I thank you, and I am going to submit some additional questions in writing and mention too, that there will be additional questions for the previous panel, the vendors and architects/engineers. I mention also that we have a rather extensive record of views from the E-5 hearing, a record as well here and from you, I appreciate this very much.

Thank you for your understanding of my time situation, Mr. Vaughan.

Now, please, the panel consisting of Wallace B. Behnke, vice chairman of Commonwealth Edison Electric Co. and accompanied, I believe, by Barton Z. Cowan of Eckert, Seamans, Cherin & Mellott; and Michael Faden, the legislative counsel of the Union of Concerned Scientists.

STATEMENT OF WALLACE B. BEHNKE, VICE CHAIRMAN, COMMONWEALTH EDISON ELECTRIC CO.

Mr. BEHNKE. Thank you very much, Mr. Simpson. Mr. Cowan and I are appearing today on behalf of the Edison Electric Institute, the Atomic Industrial Forum and the American Nuclear Energy Council, and together, we want to say how much we appreciate this opportunity to appear before you and to discuss the subject of nuclear plants and standardization and licensing reform. Each of us will briefly summarize our prepared statements which have been provided to your committee. We would respectfully request that these be included in the record of the proceedings as if read.

Senator SIMPSON. Without objection.

Mr. BEHNKE. There are serious ongoing problems in the nuclear industry. Others talked about them at some length today. Many of these problems are directly related to nuclear regulation. The problems of public confidence today concerning nuclear power are as much economic as they are with safety. This should come as no surprise.

The economic cost resulting from these regulatory problems has been enormous, with nuclear plant reliability reduced and further deployment of the nuclear energy option in the United States virtually foreclosed. No responsible person argues against high standards and strict quality control along with the pursuit of excellence in the design, construction, and plant operations wherever the public health and safety is involved.

But one has only to look at the success of civilian nuclear power overseas to sense that something is inherently wrong with nuclear regulation in the United States.

The problems with respect to the Commission's technical determinations, including but not limited to ratcheting and backfitting have been manifest for the better part of two decades. More recently, the Commission's own procedural deficiencies have come to the forefront and are adversely affecting the construction and licensing of nuclear powerplants.

Following the TMI occurrence and with the benefit of hindsight, it is now clearly evident that the regulatory process has failed to respond effectively to the exigencies of the licensing situation. There is no reason to believe that a process originally designed to handle licensing proceedings and which has operated poorly in so many of those cases will be any more responsible to the situation of the operating plants.

Those of us responsible for the Nation's electric power supply believe that a high priority should be assigned to corrective action to ensure that the NRC regulatory process does not impede the ongoing safe, reliable and cost-efficient operation of the nuclearpower plants in which several hundred billion dollars have been invested and on which the Nation is relying in significant and increasing measure for its electric power supplies.

There is also an immediate and urgent need to minimize the economic waste resulting from delays in licensing and startup of plants under construction.

At the same time, steps should be taken now to lift the barriers to the licensing of future plants needed in the 1990's and beyond.

Lifting these barriers will be a slow and difficult task. It will involve both overhaul of the process itself and restoration of confidence in the stability of nuclear regulation on the part of utility decisionmakers, public utility commissions, and the financial community.

Clearly, enactment of a nuclear standardization and licensing bill would be a critical first step in this process.

We are pleased that both NRC and DOE are in substantial agreement on the underlying rationale of standardization and other objectives of this legislation. Both bills, as you know, would provide authority to the NRC to issue combined construction permits and operating licenses. Our industry has long seen such authority as the cornerstone of a stable licensing system which would once again permit consideration of nuclear power as a viable option for the future.

Both bills also provide for NRC generic approval of standard designs and separate site certification. While we have some specific problems with the approach taken, the industry endorses the basic concepts as essential.

We urge your subcommittee to move expeditiously to report a nuclear standardization and licensing bill. Taken together, the NRC and DOE bills provide a good starting point for drafting such legislation. The principal benefits of such legislation, in our judgment, would be enhancement of public safety and reduction in waste and inefficiency attending the current licensing process.

Standard plant designs will benefit safety by concentrating the technical resources of the NRC, as well as the industry, on a small number of designs. Consumers will benefit from the reduced capital costs, lower financial risks associated with nuclear powerplants and from the economies associated with approved online performance and reliability.

With that brief statement, I would like to now turn to Mr. Cowan, who will summarize his statement.

Thank you.

Senator SIMPSON. Let me recognize Mr. Cowan. I think the last time you were here, I galloped out of here for a rollcall vote, leaving you speaking into the vapors. Was that not correct?

Mr. COWAN. I believe that is correct, Senator.

STATEMENT OF BARTON Z. COWAN, CHAIRMAN, LAWYERS COMMITTEE, THE ATOMIC INDUSTRIAL FORUM

Mr. COWAN. My written testimony discusses at some length the regulatory reform legislation proposed by the NRC and DOE. In that testimony, I indicate where we agree or disagree with the various legislative proposals and in some instances, where we suggest alternatives which we think would result in a sounder regulatory process.

In the interest of time, I will not detail those here. Commissioner Asselstine in his testimony this afternoon opposed the NRC bill which was submitted by the other four Commissioners and gave a restatement of the position which he took in his letter to you, Senator Simpson, dated March 11, 1985. Attached to my testimony is a detailed memorandum commenting on the Commissioner's letter and responding to the criticisms which he makes. As I indicated, that memorandum analysis shows that the position of the proposed bill would undermine current safety standards and unreasonably restrict the public's right to participate in the licensing process. It is not well taken.

The main difficulty that we see—which was suggested—with the overall approach suggested by Commissioner Asselstine, is that while he is generally in favor of standardization and greater technical and operational detail at the front end of the process, his suggestions generally undermine the realization of those aims. If industry discipline and commitment at the front end of the licensing process are not matched by regulatory discipline and commitment thereafter, no new nuclear plants will be built in this country. Any nuclear licensing reform legislation that does not take into account this fact would be inadequate.

Senator SIMPSON. Thank you very much. I appreciate those additional remarks.

Now, Michael Faden, please.

STATEMENT OF MICHAEL E. FADEN, LEGISLATIVE COUNSEL, UNION OF CONCERNED SCIENTISTS

Mr. FADEN. Thank you, Senator.

As always, it is a pleasure to be here, and I appreciate your evenhandedness.

Senator SIMPSON. Eight minutes.

Mr. FADEN. Thank you.

As the testimony indicates, I am here representing not only the Union of Concerned Scientists, but six other national environmental and energy groups. I have a written statement which I would ask be put in the record.

Senator SIMPSON. Without objection.

Mr. FADEN. I also ask that the "Safety Second" study by UCS which goes into some detail on our views of the licensing process and the problems inherent in it be included.

Senator SIMPSON. Is it a rather bulky document?

Mr. FADEN. Moderately bulky, sir.

Senator SIMPSON. Moderately bulky. I will tell you about the pressures of everything I take in. It will be thoroughly reviewed. It will be reviewed by minority and majority staff carefully.

Mr. FADEN. I appreciate that, Senator. The theme of standardization that we have heard so much about today, in my view, does reflect a healthy, if a little bit belated, realization that many of the industry's current problems stem from the design-as-you-go practices that you have often criticized and that have persisted since the industry's early years. But more importantly, this emphasis on standardization also underlines the authors of this legislation's need to deflect the controversy that has surrounded earlier legislative attempts that would effectively exclude the public from the nuclear regulatory process. Unfortunately, these bills go at least as far as past year's proposals, and in some respects, even farther, in cutting back the rights of citizens to have a role in the licensing of reactors they may live nearby.

Far from simply encouraging standardized designs, these bills would fundamentally alter the balance in the Atomic Energy Act, adhered to by the Congress for three decades, in favor of public participation as a tradeoff for the preemption of State and local regulatory power in this area.

Let me first turn to the specific provisions having to do with standardization. This legislation, in our view, is not necessary to encourage the use of standardized designs.

The NRC already has all legal authority it needs to license standardized plant designs, a point the agency itself has admitted in previous congressional testimony. It is hardly the case that NRC has erected a barrier to standardization. Instead, the industry for reasons of its own has, until recently, insisted on building custom designed plants.

The key element of genuine standardization is simply requiring the applicant to submit a complete, final design before construction begins. Only a complete design would permit meaningful NRC review, advance resolution of safety issues, and a clearly scheduled construction process.

Unfortunately, neither the NRC nor the DOE bill requires NRC to license only plants that use a standard design. Nor does either bill require NRC to receive and approve a complete, final plant design before it issues either a construction permit or a one-step license. In other words, neither bill guarantees standardization or puts a halt to the design-as-you-go process. That is why, in our view, neither bill delivers what it promises.

Unfortunately, also, both bills do have a number of negative effects. Neither of them requires NRC to have resolved all outstanding safety issues in a standardized design that it approves. But both of them do restrict NRC's authority to deal with safety issues that arise after the standard design is approved, regardless of whether that issue was litigated in the original design proceeding.

In addition, both NRC and DOE bills make it very difficult to modify any licensing action, whether it is with respect to the standard design or a custom design, after that action is taken. This is what has been called the backfitting provision.

We believe that the backfitting provision in this legislation limits NRC's authority to issue changes in the designs, hardware and operations of nuclear powerplants in a way that is worse than mischievous.

Essentially, this is dealt with in much more detail in our written testimony. The backfitting provisions in here would tie all changes to an overall plant risk assessment, known in the trade as a probabilistic risk assessment. These can tie NRC up for months if not years and are virtually impossible for outside experts to analyze, let alone criticize.

Beyond these problems, the bills that you have before you undercut in very specific ways the public's right to participate in NRC's licensing decisions.

Commissioner Asselstine has highlighted a couple of the major problems. I won't repeat his comments except to say that we very strongly agree with them. Let me summarize, I hope a little bit short of my 8 minutes, by saying that this sort of regulatory reform cannot cure the nuclear industry's ills.

The safety, reliability, financial and public acceptance problems that the industry has faced over recent years will not be erased by curtailing adjudicatory hearings or placing restrictions on backfits that are so onerous as to prevent the correction of serious safety defects. On the contrary, enactment of this sort of legislation will produce two negative results: It will hide many of the real problems from view and make it less likely that they will be addressed until the next accident or near miss, such as the Davis-Besse incident you referred to, and the fact of the mere passage of this legislation will further reduce the public's confidence in the industry and its regulators.

You have heard about stability today. I would simply close by saying stability has to come from the ground up. It cannot be ordered from the top down. The technology has to be stabilized first. When that is done, the regulatory process can be stabilized after it.

Thank you very much.

Senator SIMPSON. Thank you very much.

Let me ask both groups a question about Davis-Besse and the Commission's 6-year odyssey leading to the incident last month. What lessons should we draw from the Commission's handling of the auxiliary feed water system backfit issue in that case? Does it suggest to either of you the level of discipline on the part of the Commission that is essential to ensuring that the country's nuclear powerplants operate safely?

Mr. **Behnke**. May I start, Senator?

Senator **Simpson**. Please.

Mr. **Behnke**. I must confess at this point that much of the industry is still terribly in the dark as to what transpired at Davis-Besse, because the NRC, I don't believe, has completed its investigation. It has still embargoes the facts. I feel really it would be premature for me to speculate with any degree of accuracy on what the lessons of Davis-Besse are.

Mr. **Faden**. I think from our point of view, Senator, it does show a certain lack of discipline, but not quite the kind of lack of discipline that the industry often refers to. What it points up is an unwillingness to make hard and fast decisions about requirements, particularly to the auxiliary feed water system. A third pump had been talked about and essentially been an NRC requirement since roughly the time of the Three Mile Island accident.

The NRC staff would not insist on its installation. The record is as simple as that. What we have here is a case of backing and filling, a paper war going on between the licensee and the staff with a reluctance of the staff to come to a decision. That reluctance was compounded in the last 2 years by the role of the committee to review generic requirements, which deserves a full look in this context.

Mr. **Cowan**. Senator, can I add a generic comment on Davis-Besse?

Senator **Simpson**. Yes.

Mr. **Cowan**. The case of Davis-Besse, I think, points to the need for an NRC discipline control evacuating process. If there had been such a discipline process in place, it would have required the Commission and its staff to take a systematic, disciplined look at the proposed changes, the relative priority of those changes versus other changes that were also in the works at the time, and would have provided a vehicle for internal Commission management review of the disposition of those changes at a far earlier stage than apparently was the case at Davis-Besse.

As Mr. Behnke pointed out, we do not have the results of the NRC investigation yet, so it is not possible to say, yes, there would have been a difference, or no, there would not have been a difference at Davis-Besse.

In general terms, a backfitting process would require an early look at the types of changes that apparently were proposed but not implemented at Davis-Besse.

Senator **Simpson**. It is interesting to me; Davis-Besse may be used by all factions to explain something, I gather, in a sense. Am I not correct? It is great and it is bad.

Mr. **Faden**. I think there are lessons to be learned on all sides, Senator.

Senator **Simpson**. That is the frustrating part about this job. The lessons learned with Three Mile Island, was in March 1979. We are still fumbling around and stuck. I believe I have heard the word discipline used today at least 20 times in my marvelous recognitive processes. It is just as good a word as discipline when you are talking about we in Congress getting disciplined over the budget, just about as effective.

We can't do it. We don't know what it is. Obviously, others can't do it, or it would have been done. So discipline is a very interesting word.

Let me ask you, in your testimony, Mr. Faden, you cite the Kemeny Commission recommendations, "The fundamental changes will be necessary in the organization of procedures, practice and attitudes of the NRC to prevent nuclear accidents."

We all know the organizational changes proposed by Kemeny was proposed by an agency with a single Administrator as a head, what Rogovan called the singlemost important change that could be made.

Senator Moynihan has brought up his ancillary point which was right on target, and that is with regard to training. I would bring up my ancillary point on the measure of my own, and that is, is it not time to take that step to a single Administrator based upon our 10-year experience now with the Nuclear Regulatory Commission? Or are you satisfied with the organizational structure of the Commission and its suitable operation as it is now?

Mr. **Faden**. Senator, I will not defend everything the NRC does in the way of management and organization. I don't think, however, that the answer is switching to a single Administrator form of governance. We believe and did believe in 1980, when the Kemeny recommendation was offered, that there are benefits to be had as well as inefficiencies that stem from the multiheaded Commissioner system. One of those benefits is the diversity that occasionally becomes a ground for criticism, as well as a ground for praise of the agency.

We think that diversity is, on the whole, helpful, even though it may make the place look a little chaotic now and then.

Senator **Simpson**. Do you have any comments on the single Administrator issue?

Mr. **Behnke**. I think, Senator, it is clear that the current collegial approach to decisionmaking as imposed on the Commissioners by the statute has not enabled them to bring about effective control of the regulatory process.

This is implicit in the backfitting control, the backfitting problem and the ratcheting problem and their inability to control the procedural problems that have led to interminal delays and enormous waste of the Nation's economic resources.

As we see it, there is no question but what some change in the management structure is clearly called for, and there is no question but what the single Administrator form as has been proposed by yourself would be a very positive step in the right direction. I believe you have some legislation that will address that at some point. We will be presenting our views on this subject when the matter is called for hearing.

Senator **Simpson**. Indeed, I am interested in that. I believe when I came here that collegiality and diversity were important, and they are important, except they are not there. So since they are not there, I think we ought to deal with something else. Diversity is there, but they are unable to express their diversity except by just one-on-one maybe in their homes if no one stops them at night or whatever.

If more than two meet, they violate the sunshine laws; I am not about to get into messing with the sunshine laws. I have enough trouble with immigration and Veterans and Nuclear and all the rest of it. The sunshine laws are for a purpose. They are not for the purpose of not allowing a collegial body to act. That is what they do. Two layers of lawyers in the NRC assure that they do not act. They even write letters under the sunshine laws to each other and have to clear those through those two same branches. You heard me right along with that before.

It is real. So collegiality is a zip, and so is diversity if it can't be expressed in human communication. I want to pursue that one. I would like to have your testimony on that issue when we come to it.

I have a few more questions, but I will submit those in writing to you, and I appreciate your interest and your expressions.

Thank you.

Mr. **Behnke**. Thank you very much.

Mr. **Faden**. Thank you.

Mr. **Cowan**. Thank you, sir.

Senator **Simpson**. We will conclude with Senator Grant Jones, chairman of the Finance Committee of the State senate of Texas.

He is accompanied by Patrick Raffaniello, the director of the Southwest Regional Energy Council.

If we might have order, please?

Senator, it is a special privilege for me to greet you as a man that labors in the trenches of the State legislature for about 13 years. I shall never forget that experience. It has been a most helpful one for me here. I can't really describe how, but it has. I admire people who serve in State legislatures.

Mr. **Jones**. I will submit that it would be advantageous if all your colleagues had that experience.

Senator **Simpson**. I think there is a lot of truth to that, very much so, and that they should serve both in the majority and in the minority. That is very important, that we have that marvelous opportunity.

Mr. **Jones**. Under our organizational structure we have neither a minority or a majority party. We have always been historically a one-party operation. It is beginning to change now.

Senator **Simpson**. That is true, isn't it, very much so. What is your breakdown now in the senate in Texas?

Mr. **Jones**. We have 31 members of the senate, 7 of whom are Republicans.

Senator **Simpson**. We certainly hope that will change down there.

Mr. **Jones**. Historically the Democratic Party has been further to the right than the left.

Senator **Simpson**. What is the house breakdown?

Mr. **Jones**. Out of 100, there are 53 Republicans.

Senator **Simpson**. Well, Senator, I appreciate your making this trip here and appearing before the subcommittee. Please proceed.

STATEMENT OF HON. GRANT JONES, CHAIRMAN, FINANCE COMMITTEE, TEXAS STATE SENATE, ACCOMPANIED BY PATRICK J. RAFFANIELLO, DIRECTOR, SOUTHWEST REGIONAL ENERGY COUNCIL

Mr. JONES. Thank you, sir.

Good afternoon, Mr. Chairman and members of the committee. I thank you for giving me the opportunity to visit with you this afternoon about nuclear powerplant licensing. I am Senator Grant Jones of Abilene, TX. I am chairman of the Finance Committee of the Texas senate. I am also past chairman of the Southwest Regional Energy Council, which I am representing today. The council is an organization composed of State senators and State representatives from the States of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. The testimony that I submit to you is unanimously supported by the council members of all of our States.

I have submitted several pages of prepared testimony which provides a detailed exposition of the efficacy and benefits of early site review, site banking, standardized design and a streamlined nuclear powerplant licensing process.

I respectfully request it be entered into the record of this hearing. With your permission, I will take a few minutes to outline the gist of the council's position regarding the nuclear powerplant licensing.

First, I would like to commend you, Senator, for introducing the Nuclear Power Plant Licensing and Standardization Act of 1985, Senate bill No. 836, and for your efforts in this area over the last several years. The Southwest Regional Energy Council fully supports your efforts to pass Senate bill 836.

As you members of the committee investigate issues related to energy licensing reform, please be guided by the premise that America needs energy to maintain its preeminent position in the industrialized nations of the world. Without an abundant energy supply, we could never have achieved the standard of living we enjoy. Without the capacity to supply the growing demand in the future, we will stalemate and proceed no further. Moreover, we must never forget the lessons of the 1970's.

Shame on us if we put all our energy eggs into a single basket. We must have a mix of fuel sources that will make us independent of international political fluctuations. An important part of any rational energy strategy will necessarily include the use of nuclear fusion for electrical power. It simply is not in this Nation's interest to ignore this important energy source or to let it die in a quagmire of repetitive litigation, regulatory uncertainty, and unwarranted attacks by self-declared public defenders.

The time has come for the Congress to protect the energy future of America by structuring a streamlined process for licensing of nuclear powerplants which will assure that needed plants are completed in the time required for construction while taking into consideration the need for reasonable levels of safety and public participation.

While many factors have contributed to the drastic reduction in the number of nuclear plants under construction, many have been canceled because of the tortuous path through the licensing maze.

Every time an issue appears to have been settled, it is raised again and the process repeats itself. Every time the plan is thought to satisfy all of the NRC regulations, guides, policies and positions, another is issued. It is hard to hit the regulatory bull's eye when it constantly moves.

What we seek is a system that would license a plant while examining the important safety and environmental factors a single time; that would establish a level of state of the art for a particular reactor and leave it alone; and will permit the establishment of generic findings that can be assumed for any plant unless substantial evidence is presented to show that the assumption is inapplicable.

Presently, intervenors opposing licensing of a nuclear plant can raise a single issue of nuclear stages in the licensing process. Any licensing reform program of value must contain provisions for the resolution of licensing issues one time, with severe burdens of proof required for the reopening of that issue at a later stage. If the licensing board decides at the construction permit stage that a certain issue has been resolved, it is inefficient and costly to force the applicant to respond to the same question again and again. In fact, the most powerful dilatory tool of the antinuclear element is the relitigation of issues at every stage of the proceedings.

The regulatory problems do not cease even after a nuclear plant has been completed in accordance with the design approved in the construction permit. It has been all too commonplace for regulatory changes to be forced on a utility by threats that restart after refueling would be delayed unless some staff position, unrelated to the restart, were implemented. I do not believe this was the intent of Congress when you gave the NRC the authority to promulgate regulations. Constant changes in an accepted design, commonly referred to as "backfit" must be strictly controlled and restricted to changes that are actually needed to make a substantial improvement in plant safety. In addition, the proposed change should be analyzed to determine whether the cost of implementing the change is justified by the level of improved safety. To spend millions of dollars to realize an insignificant improvement is not in the best interest of anyone, especially the consumers who ultimately pay for the changes.

Congress cannot on its own solve all the problems associated with these licensing problems. The purchasers of nuclear powerplants must accept the idea of giving up some of their preferences with regard to custom designs. The vendors of nuclear components must work to get acceptance of their designs and resist the temptation of constant modification. The NRC must have the authority and be willing to allocate the resources to approve these standard designs. Your help is desperately needed to clear the obstacles such as antitrust problems that may be inherent in the concept of standardization, and to provide the statutory restriction to unjustified backfits and unnecessary litigation.

Apart from all of the valid, and I believe persuasive, economic and safety arguments supporting early site review, standardized powerplant designs, and a streamlined permitting process, there is another powerful reason why the U.S. Congress should enact the Nuclear Powerplant Licensing and Standardization Act of 1985. I believe that a rational national energy policy would encourage a varied mix of fuel sources. Nuclear power should be a viable option for electric power generation. As a matter of fact, the people of the United States, through their duly elected representatives in the U.S. Congress have decided that nuclear power should be an available option for the generation of electricity. The Atomic Energy Act of 1954, though amended many times through the years, spells out the congressional command to the executive agencies to promote safe and efficient means of harnessing nuclear power.

The duty of the executive agencies in our form of government is clear: the agency is to carry out the commands of Congress with the powers delegated to them by Congress. The current regulatory framework for licensing nuclear powerplants fails in its basic purpose. The licensing process should facilitate the congressional intent by expediting the efficient and safe design and construction of nuclear powerplants. Instead, the current licensing process is manipulated by those who oppose any use of nuclear power. The adversaries of nuclear power have been so successful in deadlocking the licensing process that no nuclear powerplants are currently being contemplated. At a recent conference I attended, I asked the chief executive officer of an electric utility that is considered one of the best run nuclear utilities in the Nation, what would cause him to consider building a new nuclear powerplant. His answer was simple and succinct. It was the word: "Insanity."

I believe it is insanity for us to allow small, focused segments of society to manipulate the nuclear licensing process to thwart the will of the public. It may be that we as a nation will decide that nuclear power should not be an option. I believe that would be the wrong choice. But whatever the decision, the choice should not be made in the context of a regulatory proceeding, rather the choice must be made here in the legislative arena.

In conclusion, I urge this subcommittee to make the changes that will permit the expeditious licensing of nuclear plants, thorough examination of safety and environmental issues one time, and the limitation of forced design and operational changes that have a negligible effect on safety but drive the cost of electricity ever higher. I urge you to favorably report Senate bill 836.

Thank you for your consideration. I will be pleased to answer any questions you have on this subject.

Senator SIMPSON. Thank you very much. I appreciate your attendance here on short notice. You put together a very thoughtful proposal and premise. I appreciate that. I think it is the first time in my recollection that the Southwest Regional Energy Council has testified before the subcommittee. I am grateful for a new voice on any issue of licensing reform or standardization.

I wonder if you could tell me whether the nuclear energy option, in your opinion, would be given serious consideration by the five states in your council in the absence of changes in the current process?

Mr. JONES. No, sir.

Senator SIMPSON. Period?

Mr. JONES. Period. That is a considered response after a conversation with a number of people in the electrical generating industry.

Senator SIMPSON. Of course, you envision an increasing demand for electricity in the Southwest?

Mr. JONES. Yes, sir.

Senator SIMPSON. Every bit of it.

Mr. JONES. Particularly, Senator, I think it is important that we relieve fears of those who are fightened of nuclear energy, because I think with what is happening in the question of acid rain, we have got to have another energy source. Nuclear energy historically has been the safest we have had. It is my understanding people downwind from Three Mile Island got less radiation than people that are living in Denver, CO from background radiation.

Senator SIMPSON. I have never met you before, but I can tell you you are saying what I have been saying: wait until we have the acid rain event; we will find what the options are. We will come right back to the nuclear option, and I am from coal country, a hazardous statement up there, you see.

But that is what we are going to find when we get to debating that on the floor of the U.S. Senate or the U.S. House, and it has not taken place yet. The debate has not taken place in either body. We romance it around a little, but we don't ever get to that one, either. That will be another one of those moments of truth that we occasionally breed here.

Your coal-fired and nuclear, are they about the same time span now down in Texas in the Southwest region?

Mr. JONES. As a practical matter, in the State of Texas, we have no coal access. We have some lignite.

Senator SIMPSON. I mean in your electrical utilities, coal-fired utilities, you have those?

Mr. JONES. Yes. We have those, principally lignite. We are building some coal plants now. But there is a relative small part of our electricity generated by coal. Lignite, yes.

We have no on-line nuclear plants in Texas. We have two under construction.

Senator SIMPSON. If we were to approve the advanced site permit provisions that have been recommended by the NRC, do you envision any interest on the part of the States in the Southwest, as opposed to the utilities, in going out and gathering up necessary environmental information on individual sites and then getting an NRC approval on those sites so that State, in essence, might bank those sites for future use by utilities, thereby having a greater degree of safe control over site selection?

Mr. JONES. Senator, we have discussed that from time to time. We have never taken any action toward that end.

Senator SIMPSON. Then I might ask you if you heard some of that testimony threaded through the day on whether the current lack of regulatory discipline at the NRC as you referred to in your testimony——

Mr. JONES. No, sir, I did not refer to it. I did not use the word "discipline," sir.

Senator SIMPSON. You didn't what?

Mr. JONES. We did not use the word discipline.

Senator SIMPSON. It was me again. That is a flaw in my head. I did that, yes.

Obviously, why would the word stick out if I didn't use it myself?

The regulatory improvements, would they be more forthcoming? Would they come? Would they mature and develop if this agency were headed up by a single Administrator rather than the current five member collegial body?

Mr. JONES. Senator, most of our operations in the State government in Texas are done through a Commission with a single Administrator, but the Commission is the final appellate body. It is not the general operating group. We do have most of them single executive director subject to policy decisions by an appointed Commission.

Senator SIMPSON. Just a final question.

You certainly endorse the standardization provisions obviously. Would it make sense for the Congress to mandate standardization rather than simply to authorize it as one of the various options in order that we might avoid this design-as-we-go problem that has plagued the industry?

Mr. JONES. Senator, very frankly, I think you should set forth standards that could be approved with only variation for that particular site. By the same token, I think if you undertook to mandate a standard, you might very well preclude some differentiation that should be made from location to location. So I would certainly have an approval process on a standardized plant, but by the same token, I would not preclude realistic variations.

Senator SIMPSON. We will certainly be looking at all the variations and variants. I really want to thank you for coming before the subcommittee on short notice and sharing this with us. I have a hunch we will be asking for your thoughts again.

Mr. JONES. Thank you, sir.

Senator SIMPSON. You represent a very large area of the United States, which is demographically growing. I thank you very much.

Mr. JONES. I thank you, sir.

Senator SIMPSON. That would conclude the hearing, and I want to thank Jim Curtis for his very able effort, as always, my strong right arm, and Pricilla Gallerand.

We will notify you of the next meeting of the subcommittee. Thank you.

[Whereupon, at 4:45 P.M., the subcommittee was recessed to reconvene subject to the call of the Chair.]

[Statements submitted for the record follow:]

PREPARED TESTIMONY

SUBMITTED BY

UNITED STATES NUCLEAR REGULATORY COMMISSION

PRESENTED BY

NUNZIO J. PALLADINO, CHAIRMAN

TO THE

SUBCOMMITTEE ON NUCLEAR REGULATION

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

CONCERNING

LICENSING REFORM

SUBMITTED: JULY 11, 1985

Mr. Chairman, members of the Committee, I am pleased to appear before the Committee today for the purpose of discussing the Nuclear Power Plant Licensing and Standardization Act of 1985 which you, Mr. Chairman, were kind enough to introduce by request on April 2, 1985 as S.836. There is a need to improve the stability of the licensing process. The objective of S.836 is to help meet that need by improving the stability of the licensing process through legislative provisions for standardization, early site review and the issuance of a combined license to construct and to operate nuclear power plants under conditions which assure the continued protection of the public health and safety and which will be in accord with the common defense and security.

Increased stability is to be achieved principally by provisions in the bill which call for industry to specify more completely prior to the start of construction their plans for design, construction and operation of a proposed facility. Concomitantly, the Commission would specify the inspections, tests, analyses and acceptance criteria to be applied in the regulatory review. The opportunity for the NRC staff to complete a well integrated, comprehensive safety review would provide additional assurance of overall safety and reliability. There would also be a more disciplined process for modifying approved designs. In addition, the legislation includes a well ordered, DISCIPLINED PROCESS FOR TIMELY AND RESPONSIBLE PUBLIC PARTICIPATION. BY WAY OF EXPLANATION, I NOW TURN TO SOME OF THE KEY PROVISIONS OF S.836.

THE PROPOSED LEGISLATION, IF ADOPTED, WOULD AMEND EXISTING SECTION 185 OF THE ATOMIC ENERGY ACT. SUBSECTION B. OF SECTION 185 AS IT WOULD BE AMENDED AUTHORIZES ISSUANCE OF WHAT WOULD BE CALLED A COMBINED CONSTRUCTION PERMIT AND OPERATING LICENSE (CP/OL) FOR A THERMAL NEUTRON POWER GENERATION FACILITY. CURRENT LAW DOES NOT PERMIT THE CP/OL APPROACH. THUS, THIS IMPROVEMENT IN THE PROCESS CANNOT BE ACHIEVED ADMINISTRATIVELY. ALL CURRENTLY LICENSED U.S. COMMERCIAL NUCLEAR POWER REACTORS (INCLUDING ALL CURRENTLY-LICENSED U.S. GAS-COOLED REACTORS) ARE THERMAL NEUTRON POWER GENERATION FACILITIES. BREEDER REACTORS AND FUEL REPROCESSING PLANTS WOULD NOT BE COVERED BY THIS PROPOSAL. A COMBINED CP/OL COULD BE ISSUED ONLY IF THE COMMISSION DETERMINES THAT THERE IS REASONABLE ASSURANCE THAT THE FACILITY WILL BE CONSTRUCTED AND WILL OPERATE IN CONFORMITY WITH THE APPLICATION, THE PROVISIONS OF THE ATOMIC ENERGY ACT, AND THE RULES AND REGULATIONS OF THE COMMISSION.

AN IMPORTANT FEATURE OF S.836 IS THAT THE COMBINED CP/OL WOULD IDENTIFY AND INCORPORATE BY REFERENCE THE INSPECTIONS, TESTS AND ANALYSES THAT WOULD BE REQUIRED TO BE PERFORMED AND THE ACCEPTANCE CRITERIA THEREFOR TO ASSURE THE ADEQUACY OF CONSTRUCTION AND COMPLIANCE WITH REGULATORY REQUIREMENTS.

UNDER THE CURRENT TWO-STEP LICENSING PROCESS, THE INSPECTIONS, TESTS AND ANALYSES WHICH NEED TO BE PERFORMED ARE NOT FULLY OR FINALLY DEFINED UNTIL THE OPERATING LICENSE REVIEW IS COMPLETE. THUS, THE COMMISSION AND THE LICENSE APPLICANT ARE UNABLE TO IDENTIFY AND REACH AGREEMENT AT AN EARLY STAGE WITH RESPECT TO THE DETAILED IMPLEMENTATION OF NRC REQUIREMENTS, AND THE PUBLIC'S PARTICIPATION IN THIS PROCESS IS DELAYED UNTIL THE PLANT IS NEARLY COMPLETE. EXTENSIVE ADDITIONAL TESTS AND ANALYSES ARE SOMETIMES REQUIRED LATE IN THE CONSTRUCTION PROCESS. THIS MAY LEAD TO PLANT MODIFICATIONS WHICH COULD HAVE BEEN AVOIDED BY IDENTIFYING THE INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA AT THE TIME THE PLANT WAS LICENSED FOR CONSTRUCTION.

TODAY'S ADVANCED LEVEL OF DEVELOPMENT MAKES IT POSSIBLE TO ESTABLISH THE DESIGN OF A NUCLEAR POWER PLANT IN SUFFICIENT DETAIL BEFORE CONSTRUCTION COMMENCES, IN ORDER FOR THE COMMISSION TO MAKE THE REQUIRED FINDINGS OF REASONABLE ASSURANCE OF THE PUBLIC HEALTH AND SAFETY WITH RESPECT TO PLANT OPERATION. SPECIFICATION OF THE REQUIRED INSPECTIONS, TESTS, ANALYSES AND ACCEPTANCE CRITERIA IN THE COMBINED CONSTRUCTION PERMIT AND OPERATING LICENSE, WOULD ESTABLISH A CLEARLY DEFINED SET OF REQUIREMENTS GOVERNING THE LICENSEE AND THE COMMISSION IN DISCHARGING THEIR RESPECTIVE RESPONSIBILITIES WITH RESPECT TO FACILITY CONSTRUCTION AND OPERATION. IMPORTANTLY, THIS WILL ALSO FACILITATE AND MAKE MORE EFFECTIVE PUBLIC PARTICIPATION BY PROVIDING INFORMATION, PRIOR TO AUTHORIZATION OF FACILITY CONSTRUCTION, OF HOW THE APPLICANT'S

COMPLIANCE WITH SPECIFIED CONSTRUCTION AND OPERATION REQUIREMENTS WILL BE DEMONSTRATED FOLLOWING LICENSE ISSUANCE.

IN SUMMARY ON THIS POINT, SPECIFICATION OF PRESCRIBED INSPECTIONS, TESTS, ANALYSES AND ACCEPTANCE CRITERIA AS PART OF THE COMBINED CP/OL BEFORE CONSTRUCTION COMMENCES SHOULD ENHANCE THE QUALITY OF CONSTRUCTION OF NUCLEAR POWER PLANTS, ADD STABILITY TO THE REGULATORY PROCESS, AND FACILITATE PUBLIC PARTICIPATION IN NUCLEAR POWER PLANT LICENSING DECISIONS.

AFTER ISSUANCE OF THE CP/OL AND PRIOR TO COMMENCEMENT OF OPERATION THE COMMISSION MUST ASSURE THAT THE FACILITY HAS BEEN CONSTRUCTED IN CONFORMITY WITH THE CP/OL AND THE REGULATIONS OF THE COMMISSION IMPLEMENTING THIS ACT AND WITHOUT UNDUE RISK TO THE PUBLIC HEALTH AND SAFETY AND COMMON DEFENSE AND SECURITY. AN OPPORTUNITY FOR A SECOND PUBLIC HEARING WOULD BE PROVIDED PRIOR TO COMMENCEMENT OF OPERATION OF THE FACILITY IF GOOD CAUSE EXISTS THEREFOR. GOOD CAUSE FOR HEARING WOULD BE DEFINED TO EXIST ONLY WHERE AN ISSUE CONSISTS OF A SUBSTANTIAL DISPUTE OF FACT NECESSARY FOR THE COMMISSION'S DECISION THAT CANNOT BE RESOLVED WITH SUFFICIENT ACCURACY EXCEPT AT A HEARING AND EITHER (1) THE ISSUE WAS NOT AND COULD NOT HAVE BEEN RAISED AND RESOLVED IN ANY PROCEEDING FOR THE ISSUANCE, MODIFICATION OR AMENDMENT OF A LICENSE, PERMIT OR APPROVAL OF THAT FACILITY, ITS SITE OR DESIGN; OR (2) A SHOWING HAS BEEN MADE THAT (I) THERE HAS BEEN NONCONFORMANCE WITH THE LICENSE; (II) SUCH NONCONFORMANCE HAS NOT

BEEN CORRECTED; AND (III) SUCH NONCONFORMANCE COULD MATERIALLY AND ADVERSELY AFFECT THE SAFE OPERATION OF THE FACILITY. THE COMMISSION WOULD DETERMINE THE ISSUES TO BE HEARD AND WHETHER OR NOT THE HEARING MUST PRECEDE COMMENCEMENT OF OPERATION OF THE FACILITY IN ORDER TO PROVIDE REASONABLE ASSURANCE OF THE PROTECTION OF THE PUBLIC HEALTH AND SAFETY AND COMMON DEFENSE AND SECURITY. A HEARING MIGHT NOT NEED TO PRECEDE COMMENCEMENT OF OPERATION OF THE FACILITY WHERE, FOR EXAMPLE, THE RESOLUTION OF THE ISSUE TO BE HEARD COULD ONLY AFFECT SAFE OPERATION OF THE FACILITY AFTER THE FACILITY ALREADY HAS BEEN IN OPERATION FOR SOME PERIOD OF TIME. DELAY OF A HEARING MAY ALSO BE JUSTIFIED WHERE INTERIM MEASURES WOULD ALLOW THE FACILITY TO OPERATE WITH REASONABLE ASSURANCE OF THE PROTECTION OF THE PUBLIC HEALTH AND SAFETY DURING THE PERIOD NECESSARY FOR RESOLUTION OF THE DISPUTE OF FACT IN THE HEARING PROCESS.

IN THE VERSION OF THE BILL SENT TO YOU BY THE COMMISSION, SECTION 185B. ALSO PROVIDES THAT OPERATION OF THE FACILITY SHALL COMMENCE, BASED ON THE COMBINED CP/OL UNLESS THE COMMISSION DETERMINES THAT GOOD CAUSE EXISTS FOR DELAYING SUCH OPERATION. SUCH GOOD CAUSE WOULD EXIST WHERE THE COMMISSION DETERMINES THAT OPERATION CANNOT COMMENCE WITHOUT UNDUE RISK TO THE HEALTH AND SAFETY OF THE PUBLIC OR THE COMMON DEFENSE AND SECURITY. HOWEVER, A MAJORITY OF THE COMMISSION HAS RECENTLY APPROVED A MODIFICATION TO THE LANGUAGE WE PREVIOUSLY SUBMITTED, IN THE PORTION OF SECTION 185B. JUST DESCRIBED, AND PROVIDES THAT:

PRIOR TO THE COMMENCEMENT OF OPERATION, THE COMMISSION SHALL DETERMINE, BASED UPON THE REQUISITE PROGRAM OF INSPECTIONS, TESTS AND ANALYSES, WHETHER CONSTRUCTION HAS BEEN COMPLETED IN CONFORMANCE WITH THE COMBINED CONSTRUCTION PERMIT AND OPERATING LICENSE, AND CONSISTENT WITH THE REGULATIONS OF THE COMMISSION.

I DO NOT FAVOR THE MAJORITY POSITION. THE ALTERNATIVE IS A STEP AWAY FROM THE COMMISSION'S CONCEPT OF A COMBINED CONSTRUCTION PERMIT AND OPERATING LICENSE WHICH CONTEMPLATES APPROVAL OF THE SITE AND FINAL DESIGN BEFORE CONSTRUCTION COMMENCES, AND VERIFICATION OF THE ADEQUACY OF CONSTRUCTION THROUGH AN AGREED-UPON SET OF INSPECTIONS, TESTS, AND ANALYSES.

I QUESTION THE NEED FOR -- AS THE ALTERNATIVE WOULD REQUIRE -- AN AFFIRMATIVE COMMISSION VOTE IMMEDIATELY PRIOR TO PLANT OPERATION IF THE SOLE BASIS OF THAT VOTE IS TO BE A STAFF CERTIFICATION OF THE RESULTS OF A PROGRAM OF INSPECTIONS, TESTS AND ANALYSES. I AM CONCERNED THAT COMMISSION APPROVAL IMMEDIATELY PRIOR TO PLANT OPERATION WILL BECOME A SECOND COMMISSION APPROVAL NEEDED FOR PLANT OPERATION MUCH LIKE THE PRESENT TWO-STEP APPROVAL. THIS OUTCOME WOULD NOT BE CONSISTENT WITH THE OBJECTIVE OF ATTAINING THE EARLY IDENTIFICATION AND RESOLUTION OF ISSUES.

LET ME TURN NOW TO SECTION 185C. THE PURPOSE OF SUBSECTION C. IS TO GIVE GREATER CERTAINTY TO A FINAL DETERMINATION MADE IN

ANY PRIOR PROCEEDING INVOLVING A PARTICULAR FACILITY, FACILITY SITE, OR DESIGN APPROVAL FOR THAT FACILITY. PURSUANT TO THIS SUBSECTION, THE COMMISSION WOULD NOT MODIFY ANY FINAL DETERMINATION ON AN ISSUE THAT HAS BEEN CONSIDERED AND DECIDED IN A PRIOR PROCEEDING UNLESS IT DETERMINES, BASED ON SIGNIFICANT NEW INFORMATION, THAT SUCH MODIFICATION IS REQUIRED TO PROTECT THE PUBLIC HEALTH AND SAFETY OR THE COMMON DEFENSE AND SECURITY, AND THE MODIFICATION WILL SUBSTANTIALLY ENHANCE PUBLIC HEALTH AND SAFETY OR COMMON DEFENSE AND SECURITY, AS A RESULT OF IMPROVED OVERALL SAFETY OR SECURITY OF FACILITY OPERATION. SUBSECTION C. WOULD ALSO REQUIRE THE EFFECTS OF A PROPOSED MODIFICATION TO BE EVALUATED IN TERMS OF THE OVERALL SAFETY OF FACILITY OPERATION, RATHER THAN IN TERMS OF THE INDIVIDUAL SYSTEM OR COMPONENT ON WHICH THE PROPOSED MODIFICATION WOULD BE MADE. THE REASON FOR THIS REQUIREMENT IS THAT, ALTHOUGH A PARTICULAR MODIFICATION MAY IMPROVE A SYSTEM OR COMPONENT IN ISOLATION, IT MAY HAVE NO EFFECT--OR, INDEED, AN ADVERSE EFFECT--ON THE OVERALL SAFETY OF THE PLANT AS A RESULT OF THE INTERACTION OF THE MODIFIED SYSTEM OR COMPONENT WITH OTHER SYSTEMS OR COMPONENTS OF THE FACILITY. FOR EXAMPLE, A DECISION TO REQUIRE THE REACTOR COOLANT PUMPS TO BE TRIPPED FOR SMALL LOCA EVENTS TO PREVENT EXCESSIVE PRIMARY COOLANT LOSS COULD INCREASE THE SEVERITY OF A STEAM GENERATOR TUBE RUPTURE EVENT. PLAINLY, THEN, THE COMMISSION SHOULD EVALUATE THE MODIFICATION AS IT AFFECTS THE OVERALL SAFETY OF THE FACILITY RATHER THAN IN ISOLATION.

THE LICENSING PROCESS AND NUCLEAR PLANT SAFETY WOULD BE ENHANCED BY THE CAPABILITY TO COMPLETE A WELL INTEGRATED, COMPREHENSIVE SAFETY REVIEW BASED ON MORE COMPLETE DESIGN, CONSTRUCTION, AND OPERATION PLANS BY THE UTILITY. THE REGULATED INDUSTRY AND THE PUBLIC WOULD BENEFIT FROM THE DISCIPLINED AND RELATIVELY COMPLETE SAFETY REVIEW THAT WOULD GREATLY IMPROVE THE STABILITY AND PREDICTABILITY OF THE REGULATORY PROCESS DURING BOTH THE CONSTRUCTION AND OPERATION PHASES OF THE NUCLEAR PLANT LIFETIME.

THE PROPOSED LEGISLATION ALSO ADDS NEW SECTIONS INTENDED TO PERMIT THE RESOLUTION OF SITE-SPECIFIC QUESTIONS AT AN EARLY STAGE IN THE LICENSING PROCESS AND TO ENCOURAGE THE DEVELOPMENT AND USE OF STANDARDIZED DESIGNS. SECTION 193, EARLY SITE REVIEW, AND SECTION 194, APPROVAL OF DESIGNS, ARE NEW SECTIONS WHICH AUTHORIZE THE COMMISSION TO ISSUE A SITE PERMIT OR A FACILITY DESIGN APPROVAL EVEN THOUGH NO APPLICATION FOR A CONSTRUCTION PERMIT OR A COMBINED CP/OL HAS BEEN FILED. THESE SECTIONS HAVE BEEN PROPOSED TO FACILITATE EARLY IDENTIFICATION AND RESOLUTION OF SITE AND DESIGN ISSUES AFTER GIVING AN OPPORTUNITY FOR PUBLIC PARTICIPATION. THESE SECTIONS WOULD ALSO ALLOW SUBSEQUENT FACILITY APPLICATIONS TO REFERENCE A SITE PERMIT OR DESIGN APPROVAL AND HAVE THOSE FINAL DETERMINATIONS BE MADE BINDING UNLESS THERE IS A SUBSTANTIAL REASON NOT TO DO SO. NOTHING IN THE LEGISLATION WOULD REQUIRE THE COMMISSION TO ALTER ITS PRESENT PROVISIONS FOR INSTITUTING PROCEEDINGS TO MODIFY, SUSPEND OR

REVOKE A LICENSE OR TO TAKE SUCH OTHER ACTION AS MAY BE PROPER UPON REQUEST FILED WITH THE COMMISSION FOR SUCH ACTION.

THE USE OF STANDARD DESIGNS OFFERS THE POTENTIAL TO REDUCE TODAY'S LENGTHY CONSTRUCTION TIMES AND COSTS. MORE IMPORTANTLY, HOWEVER, FROM THE VIEWPOINT OF THE COMMISSION, STANDARDIZATION SHOULD FACILITATE HIGH QUALITY CONSTRUCTION AND SAFE OPERATION OF SPECIFIC PLANT DESIGNS. FOR EXAMPLE, STANDARDIZATION WOULD STIMULATE STANDARDIZED PROGRAMS OF QUALITY CONTROL AND MAKE FOR BETTER, FASTER TRAINING OF OPERATORS AND WORKERS. ALSO, EXPERIENCE GAINED FROM ONE OR ANOTHER ASPECT OF OPERATIONS WOULD BE RELEVANT TO THE OPERATING PERSONNEL, EQUIPMENT, AND PROCEDURES OF STANDARDIZED PLANTS WHEREVER THEY ARE LOCATED.

THE PROPOSED LEGISLATION LOOKS TO THE FUTURE AND GROWING DEMANDS FOR ENERGY. ALTHOUGH NO NEW POWER REACTORS HAVE BEEN ORDERED FOR SEVERAL YEARS, AND THERE IS NO CLEAR INDICATION OF WHEN NEW ORDERS MAY BE GENERATED, IT SEEMS PRUDENT TO IMPROVE THE SYSTEM NOW. THE REGULATORY APPARATUS OUGHT NOT TO BE AN UNWARRANTED OBSTACLE TO THE CONTINUED INTEGRATION OF NUCLEAR POWER INTO THE NATIONAL ENERGY MIX IF AND WHEN THE NEED MAY ARISE.

IN CONCLUSION, THE MAJORITY OF THE COMMISSION IS OF THE OPINION THAT S. 836 PROVIDES A VEHICLE BY WHICH THE COMMISSION CAN IMPROVE THE QUALITY, EFFECTIVENESS AND EFFICIENCY OF THE LICENSING PROCESS CONSISTENT WITH THE PROTECTION OF THE PUBLIC HEALTH AND

SAFETY AND THE OPPORTUNITY FOR RESPONSIBLE PUBLIC PARTICIPATION IN THE PROCESS.

AS SUGGESTED IN YOUR LETTER OF JUNE 20, 1985, THE LEGISLATIVE PROPOSALS OF THE NRC AND THE DEPARTMENT OF ENERGY (DOE) DIFFER IN SOME RESPECTS ALTHOUGH BOTH ARE INTENDED TO FOSTER INCREASED USE OF STANDARD DESIGNS IN NUCLEAR LICENSING. IN GENERAL THE DOE BILL IS MORE PRESCRIPTIVE THAN THE NRC BILL REGARDING THE REFERENCEABILITY OF APPROVED DESIGNS IN LICENSING PROCEEDINGS, MODIFICATION OF AN APPROVAL BASED ON NEW INFORMATION, RENEWAL OF AN APPROVAL AFTER AN INITIAL 10-YEAR PERIOD, AND PERMISSIBILITY OF VARIATIONS FROM THE APPROVED DESIGN BY APPLICANTS. WHILE THE COMMISSION FULLY SUPPORTS A STRONG LEGISLATIVE FRAMEWORK FOR DESIGN APPROVALS, THE COMMISSION MUST BE PERMITTED ADEQUATE DISCRETION TO MODIFY OR LIMIT THE USE OF PREVIOUS DESIGN APPROVALS WHERE, IN THE COMMISSION'S JUDGMENT, THE PUBLIC HEALTH AND SAFETY SO REQUIRES. FOR THIS REASON THE COMMISSION CONTINUES TO SUPPORT THE GREATER FLEXIBILITY INHERENT IN ITS BILL.

NUCLEAR TRAINING ACADEMY

MR. CHAIRMAN, YOU ALSO REQUESTED THE COMMISSION'S COMMENTS ON THE NATIONAL NUCLEAR POWER PLANT PERSONNEL TRAINING ACT OF 1985 WHICH WAS INTRODUCED BY SENATOR DANIEL MOYNIHAN ON JANUARY 3, 1985. THE BILL STATES A NEED TO IMPROVE TRAINING PROGRAMS AND PROPOSES THAT NRC ESTABLISH A NATIONAL ACADEMY FOR NUCLEAR POWER

SAFETY. THE PURPOSE OF THE ACADEMY WOULD BE TO TRAIN CIVILIAN NUCLEAR POWER PLANT PERSONNEL IN BASIC, SAFE NUCLEAR POWER PLANT OPERATIONS.

THE GOAL OF THE PROPOSED ACADEMY IS COMMENDABLE, THAT IS, TO IMPROVE TRAINING OF NUCLEAR POWER PLANT PERSONNEL, AND WE STRONGLY SUPPORT IMPROVED TRAINING. HOWEVER, WE HAVE SEVERAL CONCERNS WITH THIS BILL THAT MERIT CAREFUL CONSIDERATION. TO BETTER UNDERSTAND THESE CONCERNS LET ME PROVIDE SOME BACKGROUND ON THE SUBJECT OF TRAINING.

FOLLOWING THE THREE MILE ISLAND ACCIDENT, SEVERAL STUDIES IDENTIFIED THE NEED TO IMPROVE TRAINING PROGRAMS. SINCE THEN, THE INSTITUTE OF NUCLEAR POWER OPERATIONS (INPO) AND THE NRC HAVE INITIATED EFFORTS TO IMPROVE TRAINING AT NUCLEAR POWER PLANTS. INITIALLY, NRC REQUIRED UPGRADED TRAINING PROGRAMS IN HEAT TRANSFER, FLUID FLOW AND THERMODYNAMICS AS WELL AS MITIGATING CORE DAMAGE. MORE RECENTLY, INPO HAS DEVELOPED A TRAINING ACCREDITATION PROGRAM WHICH EMPHASIZES THE DEVELOPMENT AND IMPLEMENTATION OF TRAINING TO ENHANCE JOB PERFORMANCE. ACCREDITATION IS ACHIEVED BY INDIVIDUAL NUCLEAR PLANTS WHICH MEET SPECIFIC TRAINING PROGRAM OBJECTIVES. IN RESPONSE TO THE NUCLEAR WASTE POLICY ACT OF 1982, THE NRC HAS ISSUED A POLICY STATEMENT ON TRAINING AND QUALIFICATIONS OF NUCLEAR POWER PLANT PERSONNEL (MARCH 20, 1985) WHICH ENDORSES INPO ACCREDITATION. WITH YOUR

PERMISSION, I WOULD LIKE TO SUBMIT A COPY OF THAT POLICY STATEMENT FOR THE RECORD.

OPERATOR TRAINING TYPICALLY CONSISTS OF THREE PHASES: (1) BASIC THEORY (THREE TO FOUR MONTHS); (2) PLANT-SPECIFIC CLASSROOM (TWO TO THREE MONTHS); AND (3) SIMULATOR AND ON-THE-JOB TRAINING (FOUR TO FIVE MONTHS). THE PROPOSED ACADEMY WOULD BE BEST SUITED TO PROVIDING BASIC THEORY AND POSSIBLY SOME GENERIC REACTOR VENDOR TRAINING; GIVEN UNLIMITED FUNDS, IT COULD PROVIDE A FULL RANGE OF TRAINING OPPORTUNITIES. THE REMAINDER OF THE TRAINING REQUIRES EMPHASIS ON PLANT-SPECIFIC DETAILS. THEREFORE, INPO'S ACCREDITATION PROGRAM OR NRC APPROVAL OF LICENSEE PROGRAMS WOULD STILL BE NECESSARY TO ENSURE APPROPRIATE PLANT-SPECIFIC TRAINING. ONE CONCERN IS THAT THE RELATIONSHIPS BETWEEN ACADEMY TRAINING AND INPO ACCREDITATION BE EVALUATED AND SPECIFIED IN ORDER TO NOT ADVERSELY IMPACT ONGOING PROGRAMS.

A SECOND CONCERN IS THAT THE PROPOSED ACADEMY COULD IMPACT THE COOPERATIVE EFFORTS BETWEEN COLLEGES AND UTILITIES IN THEIR DEVELOPMENT OF PROGRAMS WHICH PROVIDE ACADEMIC COURSES RELEVANT FOR NUCLEAR OPERATIONS PERSONNEL IN MEETING THEIR GENERIC TRAINING NEEDS. THESE PROGRAMS GIVE COLLEGE CREDIT AND OFTEN ARE PART OF AN EXISTING DEGREE GRANTING PROGRAM. THE ACADEMY TRAINING MAY DUPLICATE THE MATERIAL COVERED IN THESE ACADEMIC COURSES.

FINALLY, NRC SPONSORSHIP OF A NATIONAL ACADEMY COULD BE SEEN AS CONFLICTING WITH OUR REGULATORY ROLE TO LICENSE REACTOR OPERATORS INCLUDING, WE PRESUME, OPERATORS TRAINED AT THE ACADEMY. SPONSORSHIP BY SOME OTHER INDEPENDENT ORGANIZATION OR GOVERNMENT AGENCY, SUCH AS DOE, MAY BE MORE APPROPRIATE.

IT IS NECESSARY TO EVALUATE WHETHER THE GOAL OF IMPROVED TRAINING CANNOT BE ACHIEVED THROUGH EXISTING ORGANIZATIONS AND PROGRAMS. TODAY, EFFORTS ARE UNDERWAY TO IMPROVE TRAINING, AND CONSIDERATION OF AN ACADEMY SHOULD BE EVALUATED IN LIGHT OF PRESENT ENDEAVORS BY THE NRC, THE INDUSTRY, AND ACADEMIC INSTITUTIONS.

WHILE ENCOURAGING IMPROVED TRAINING PROGRAMS, THE COMMISSION CANNOT AT THIS POINT FULLY ENDORSE THE NUCLEAR ACADEMY PROPOSAL AS THE BEST WAY TO ACHIEVE SUCH IMPROVEMENT.

COMMISSIONERS ZECH AND ASSELSTINE SUPPORT THE MOYNIHAN BILL IN PRINCIPLE, CERTAINLY FOR THE LONG TERM. THEY BELIEVE THAT MORE CONSIDERATION NEEDS TO BE GIVEN TO HOW IT WOULD BE IMPLEMENTED AND SPECIFICALLY TO HOW EDUCATION AND BASIC TRAINING WOULD BE INTEGRATED WITH SIMULATOR AND ON-THE-JOB TRAINING AND EVEN PLANT-SPECIFIC TRAINING. THEY BELIEVE THAT A NATIONAL ACADEMY, AS DESCRIBED IN THE MOYNIHAN BILL, COULD CONTRIBUTE TO INCREASED SAFETY OF NUCLEAR PLANT OPERATIONS.

THIS CONCLUDES THE COMMISSION'S PREPARED STATEMENT, MR. CHAIRMAN. WE APPRECIATE THE OPPORTUNITY TO DISCUSS THESE IMPORTANT MATTERS WITH THE SUBCOMMITTEE THIS MORNING AND WILL BE GLAD TO RESPOND TO ANY QUESTIONS YOU MAY HAVE.

10 CFR Ch. I

Commission Policy Statement on Training and Qualification of Nuclear Power Plant Personnel

AGENCY: Nuclear Regulatory Commission.

ACTION: Policy Statement.

SUMMARY: This statement presents the policy of the Nuclear Regulatory Commission (NRC) with respect to training and personnel qualification and describes the activities that the NRC will use to execute its responsibilities to ensure the health and safety of the public. This Policy Statement provides regulatory guidance called for by the Nuclear Waste Policy Act (Pub. L. 97-425) which directed the NRC to promulgate regulations or other regulatory guidance for the training and qualifications of civilian nuclear power plant operator, supervisors, technicians and other appropriate operating personnel. In recognition of industry initiatives underway to upgrade training programs, the NRC endorses the Institute of Nuclear Power Operations (INPO)-managed Training Accreditation Program in that it encompasses the elements of performance-based training and will provide the basis to ensure that personnel have qualifications commensurate with the performance requirements of their jobs. It remains the continuing responsibility of the NRC to independently evaluate applicant's and licensees' implementation of improvement programs to ensure that desired results are achieved. Nothing in this Policy Statement shall limit the authority or responsibility of the NRC to follow up on operational events or place any limit on NRC's enforcement authority when regulatory requirements are not met. However, while evaluating the effectiveness of this guidance in lieu of a new training regulation, the NRC intends to exercise some discretion in enforcement matters related to training and qualification of nuclear plant personnel and refrain from new rulemaking in this area for a period of at least two years from the effective date of this Policy Statement.

EFFECTIVE DATE: March 20, 1985.

FOR FURTHER INFORMATION CONTACT: William T. Russell, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, telephone (301) 492-4803.

SUPPLEMENTARY INFORMATION:

Background

The Nuclear Waste Policy Act (42 USC 10101 et seq.), section 306, directed the Nuclear Regulatory Commission (NRC) to promulgate regulations or other regulatory guidance for the training and qualifications of civilian nuclear power plant operators, supervisors, technicians and other appropriate operating personnel. This Policy Statement is responsive to the mandate of the Nuclear Waste Policy Act for regulatory guidance on training and qualifications for nuclear power plant personnel. Regulations or regulatory guidance in the remaining areas are being developed separately.

Following the accident at TMI-2, the NRC has emphasized the need to upgrade training and qualifications of nuclear power plant personnel. In the TMI Action Plan, NUREG-0660, 1980, the NRC cited its ongoing study of accreditation of training programs in the industry as a possible means of upgrading training. Since that time, the Institute of Nuclear Power Operations (INPO) has developed a training accreditation program which the NRC has found to be an acceptable means of industry self-improvement in training. The NRC has, therefore, made INPO accreditation the focus of the policy set forth here for training, allowing the industry a minimum of two years of accreditation activity without the introduction of new NRC training regulations.

The following statement sets forth the policy of the NRC with respect to training and qualification and describes the activities that the NRC will use to execute its responsibilities to ensure the health and safety of the public.

Policy Statement

The Commission recognizes that the industry, through the initiatives of the Nuclear Utility Management and Human Resources Committee (NUMARC) and the Institute of Nuclear Power Operations (INPO), has made progress in developing programs to improve nuclear utility training and personnel qualification. While some of these efforts have only recently been initiated, the Commission realizes the importance of industry's initiative and wishes to encourage further self-improvement. Subject to the continued success of INPO programs and NRC's ability to monitor their effectiveness, the Commission will refrain from new rulemaking in the area of training for a minimum period of two years from the effective date of this Policy Statement. While the Commission is deferring rulemaking in this area in recognition of the industry efforts to date, the NRC can only exercise this flexibility as long as the industry programs produce the desired results. It remains the continuing responsibility of the NRC to independently evaluate applicants' and licensees' implementation of improvement programs to ensure these results are achieved and to evaluate the possible need for further NRC action based on the success of industry programs after a two-year period.

The following paragraphs present the NRC policy with respect to licensees' and applicants' programs for personnel training and qualifications.

The nuclear power industry, through programs being coordinated by INPO, has made and is making progress toward improving the training of nuclear power plant personnel by accreditation of training programs. The NRC endorses the INPO-managed Training Accreditation Program in that it encompasses the elements of effective performance-based training.

The NRC considers the following five elements as essential to acceptable training programs:

- Systematic analysis of the jobs to be performed.
- Learning objectives derived from the analysis which describe desired performance after training.
- Training design and implementation based on the learning objectives.
- Evaluation of trainee mastery of the objectives during training.
- Evaluation and revision of the training based on the performance of trained personnel in the job setting.

The NRC recognizes that the INPO-managed accreditation of utility training includes the following training programs:

- Non-licensed operator.
- Control room operator.
- Senior control room operator/shift supervisor.
- Shift technical advisor.
- Instrument and control technician.
- Electrical maintenance personnel.
- Mechanical maintenance personnel.
- Radiological protection technician.
- Chemistry technicians.
- On-site technical staff and managers.

All utilities have committed to achieving accreditation of each of the above training programs. It is understood that each licensee will exert best efforts to have all such programs ready for accreditation (i.e., final self-evaluation report submitted to INPO) by the end of 1986. It is also understood that applicants for operating licenses will exert best efforts to have all such programs ready for accreditation within two years after issuance of a full-power operating license.

For operating reactors, accreditation of the above training programs constitutes a method acceptable to the NRC for implementing performance-based training. The NRC will continue to review and approve all applicant training programs in accordance with applicable regulations, regulatory guidance, and the Standard Review Plan and to conduct inspections necessary to determine that current regulations and license training commitments are being met. Notwithstanding this Policy guidance, regulations in 10 CFR Part 55 regarding licensed operators will continue to be the basis for evaluation of applications for operators' licenses.

It should be noted that training programs for which regulations are currently in place (e.g., fire brigade, emergency response, security) or which are not subject to INPO accreditation (e.g., quality assurance) are not affected by this Policy Statement.

To assure that the nuclear industry's training program improvements are effective, the NRC will continue to closely monitor the process and its results by the following:

- Recommending a member to serve on each Accrediting Board;
- Having an NRC staff member attend and observe Accrediting Board meetings with the INPO staff and/or the utility representatives;
- Periodically observing accreditation team site visits;
- Accompanying INPO on selected plant evaluations;
- Meeting with INPO to share information on projects and activities;
- Reviewing pertinent accreditation documents;
- Including a training summary evaluation as part of each systematic assessment report of licensee performance (SALP);
- Monitoring plant and industry trends and events that involve personnel errors;
- Conducting operator licensing exams;
- Conducting operator requalification exams, consistent with Commission policy;
- Continuing evaluation of industrywide training qualification program effectiveness; and
- Conducting performance-oriented training inspections to assess the level of knowledge of plant personnel.

In addition, INPO will:

- Continue to manage the industry accreditation program;
- Continue to conduct performance-oriented evaluations of training and qualification programs;
- Make generic accreditation documents (program description and criteria) publicly available; and
- Review and consider NRC recommendations regarding training.

Also, the industry, through NUMARC or other appropriate methods, will:

- Brief the Commission periodically on program status; and
- Provide periodic status reports to the NRC staff including plant accreditation status.

Personnel Qualifications

The NRC and industry recognize that the qualifications of personnel at nuclear power plants should be commensurate with the requirements of the jobs they perform. Since the INPO managed accreditation and evaluation programs are performance-based, this policy statement assumes that training programs for those positions covered will provide appropriately qualified personnel. For positions outside the scope of the INPO-managed accreditation program, for licensed operators and senior operators, and for all personnel at facilities applying for an operating license, NRC staff will continue to review qualifications in accordance with appropriate regulatory policy guidance.

NRC will use the same general methods described above for training to monitor the industry's progress in improving the qualifications of nuclear power plant personnel.

Enforcement policy

Notwithstanding its Enforcement Policy in 10 CFR Part 2, Appendix C, 49 FR 8583 (March 8, 1984), the Commission will exercise some discretion in selecting appropriate enforcement action for violations involving training in light of the NUMARC/INPO initiative. Licensees who are making reasonable efforts in developing and implementing the INPO/NUMARC programs described above will generally not be cited for violations related to these programs, provided the violations, whether or not identified by NRC, are appropriately corrected in a timely manner. However, violations which are not corrected in a timely manner, violations of any applicable reporting requirement, and any willful violation may be subject to enforcement. Any enforcement action taken during this grace period will be taken only with Commission concurrence. In addition to required reports and inspections, information requests under 10 CFR 50.54(f) may be made and enforcement meetings held to ensure understanding of corrective actions. Orders may be issued where necessary to achieve corrective actions on matters affecting plant safety. In brief, the NRC's decision to use discretion in enforcement in order to recognize industry initiatives in no way changes the NRC's ability to issue orders, call enforcement meetings or suspend licenses when a safety problem is found. Nothing in this Policy Statement shall limit the authority of the NRC to conduct inspections as deemed necessary and to take appropriate enforcement action when regulatory requirements are not met.

Dated at Washington, DC this 14th day of March, 1985.

For the Nuclear Regulatory Commission.

John C. Hoyle,

Assistant Secretary of the Commission.

➤ 50 FR 11030
Published 3/19/85
Effective 3/19/85

Statement of Policy: Handling of Late Allegations

AGENCY: Nuclear Regulatory Commission.

ACTION: Statement of Policy: Handling of Late Allegations.

SUMMARY: This policy statement presents the criteria the Commission will follow in addressing late allegations received from sources outside the Commission, in the context of licensing reviews. It also directs that the staff's procedures for notifying Atomic Safety and Licensing Boards, Atomic Safety and Licensing Appeal Boards, and the Commission of the receipt of allegations be revised to provide for an initial, coarse screening prior to issuance of a Board Notification.

EFFECTIVE DATE: March 19, 1985.

FOR FURTHER INFORMATION CONTACT: Lawrence J. Chandler, Office of the Executive Legal Director, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Telephone 301-492-8658.

SUPPLEMENTARY INFORMATION:

Statement of Policy

The purpose of this policy statement is to explain the policy which the Commission expects to follow regarding the treatment of late allegations, received from sources outside the Commission, in operating license reviews and in the board notification process. The focus of this statement is on NRC staff and Commission pre-licensing safety reviews of uncontested issues, and Commission pre-licensing immediate effectiveness reviews of contested issues. The treatment of allegations in formal adjudicatory licensing proceedings will continue to be governed by the Rules of Practice in 10 CFR Part 2. Apart from this policy statement, the Commission has initiated a rulemaking to codify NRC caselaw criteria for reopening a closed evidentiary record in a formal licensing proceeding and to specify further the documentary bases for motions to reopen, including those which may be based on allegations. 49 FR 50189 (December 27, 1984).

The most fundamental tenet flowing from the NRC's statutory mandate under the Atomic Energy Act is that a license may be issued only if it can be found that there is reasonable assurance that the activity to be authorized presents no undue risk to the health and safety of the public. There can be no abdication of the responsibility to make this determination and if there is a serious question as to the ability to make such finding, no license may be issued and the time necessary to resolve such question must and will be taken. Therefore, in the context of late allegations, it is necessary that appropriate criteria be applied to enable the decisionmaker, be it the NRC's staff or the Commission itself, to expeditiously determine the significance, in terms of safe operation of the facility, of any allegations made.

In connection with its review of a number of recent cases, the NRC has been confronted with the task of addressing large numbers of allegations which were brought to its attention very shortly before, and in some cases on the eve of, the date on which a decision on whether to authorize the issuance of an operating license was to be made. Some of these allegations related to matters in controversy and others related to previously uncontested issues not under consideration by a particular adjudicatory tribunal. Significant commitments of staff resources often must be diverted at the last minute to address large numbers of late allegations, many of which have proven to be unsubstantiated or of little, if any, safety significance.

Ideally, all allegations concerning a particular facility will be resolved before any license is authorized. If, however, because of the number of allegations and/or their tardy submission, all allegations cannot be resolved in a timeframe consistent with reasonable and responsible licensing action, it may be necessary to give priority to those allegations which, because of their potential impact on safety, must be resolved before licensing action can be taken.

Initial Screening of Allegations

Any concerns bearing on the safety of a facility should be brought promptly to the attention of the applicant or licensee.[1] If, however, this approach is unsatisfactory, any person is free to bring such concerns directly to the NRC. To eliminate unnecessary delay in the licensing process to the extent possible, any person who has an allegation concerning the design, construction, operation, or management of a nuclear power plant has a duty to bring such information to the Commission's attention as promptly as possible. All allegations should be specific and documented to the fullest extent possible. Those submitting allegations in good faith should be aware that

---

[1] The Commission encourages the establishment of programs by utilities for the purpose of identifying and resolving allegations affecting safety in a timely manner as design and construction of a nuclear facility proceeds.

STATEMENT BY JAMES K. ASSELSTINE
COMMISSIONER, U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE
SUBCOMMITTEE ON NUCLEAR REGULATION
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
JULY 11, 1985

Mr. Chairman, although I support legislation to bring about the greater use of standardization in nuclear power plant design and to correct the quality assurance, construction and management problems which have occurred in recent years, I cannot support the Commission's proposal in its present form. The Commission's proposal does not go far enough in requiring the development of complete standardized designs, and it contains seriously flawed provisions which would undermine current safety standards and unreasonably restrict the public's right to participate in licensing proceedings. My concerns about the Commission's current proposal are as follows:

Under the Commission's previous legislative proposal, which I supported, the provision allowing for the issuance of a combined construction permit and operating license (CP/OL) required the application to contain "sufficient information to support the issuance of both a construction permit and an operating license" in accordance with present NRC regulations. The Commission has watered this down to require submission merely of "sufficient information to support issuance of a combined construction permit and operating license." The Commission has not explained why a combined CP/OL should require less information than the separately issued CP and OL, nor has it defined the level of information needed to issue a combined CP/OL.

Mr. Chairman, I am pleased that a majority of the Commission has agreed to modify the Commission's proposal to require a finding prior to plant operation on the adequacy of the plant's construction. I would have gone further to require preoperational reviews of the plant's readiness for operation, the sufficiency of emergency planning measures, and any significant safety issues not previously considered. The Commission also argues that the inspections, tests, analyses, and acceptance criteria specified in the combined CP/OL will assure the proper construction of the plant and its readiness for operation. While I certainly support efforts to attempt to define in advance the measures that we intend to use to verify the adequacy of construction and the readiness for operation, I remain skeptical that such efforts will necessarily answer all questions and identify all possible concerns. Indeed, our unfortunate experiences in recent years with the unforeseen safety problems and with construction projects which have run into difficulties and have, in some cases, been cancelled provide a basis for skepticism here. The legislation should be clear that completion of these inspections, tests and analyses are a necessary, but perhaps not sufficient. basis in all cases for authorization of plant operation.

The Commission's 1985 bill would place a very high threshold on the ability of a member of the public to obtain a hearing after the issuance of the combined CP/OL. In order to designate an issue for a hearing the Commission would have to find that (a) the issue consists of a substantial dispute of fact, (b) resolution of the issue is necessary for the Commission's decision, (c) the issue cannot be resolved with sufficient accuracy except at a hearing, and (d) either (i) the issue was not and could not have been raised and resolved in any prior proceeding for that facility, or (ii) that (1) there has been a nonconformance with the license, (2) such nonconformance has not been corrected, and (3) such nonconformance could materially and adversely affect the safe operation of the plant. As a practical matter, this thicket of obstacles will make it impossible for people living close to a plant to obtain a hearing on the issues such as emergency planning, adequacy of plant construction and readiness for operation, which are of greatest concern to them. I am opposed to these new obstacles to state and public participation in our licensing proceedings. I believe that the smooth operation of the licensing system does not require the public's hearing rights to be artificially restricted. Indeed, I am persuaded that the Commission's efforts to silence the public will only stimulate opposition to future nuclear power plants.

In addition, I would point out that the combined CP/OL, early site review, and standardized design provisions of the bill contain a statutory limitation on backfitting. Putting aside my reservations about the wisdom of the Commission's proposed backfitting standard (conditioning a backfit on a showing that it will substantially advance public health and safety by improving overall plant safety), I recommend that the Congress not enact these provisions. As the Commission itself noted when it submitted its 1983 proposal, this is a problem which can be better addressed in the Commission's regulations. The Commission has had relatively little experience with formal backfitting standards. If this formulation turns out to be unworkable and detrimental to safety, the regulations could be modified relatively easily. A statute would be far more difficult to amend.

For the foregoing reasons, I believe that the Commission's proposal should be redrafted (1) to ensure that plants with combined CP/OL's meet the same safety standards as plants licensed under the present regulatory scheme, and (2) to afford interested states and members of the public an opportunity for a hearing prior to plant operation on issues such as emergency planning, adequacy of plant construction and readiness for operation. In addition, I believe that a licensing and standardization bill should include other provisions not found in the Commission's proposal to bring about the greater use of improved standardized designs and to address some of the construction and quality assurance problems which have been identified in recent years. To that end, I would recommend adding provisions to the bill to require that future nuclear power plant applications use essentially complete standardized plant designs which incorporate as key design elements greater simplicity, larger margins of safety, and other characteristics that promote more efficient construction, operation, maintenance and reliability. I would also recommend requiring that future plant applications use a centralized management approach for the construction project with specified check points to assure adequate quality as construction proceeds. Such provisions would do much, in my view, to correct the mistakes of the past. Thank you.

SUMMARY REMARKS

STATEMENT
OF
BERTRAM WOLFE
VICE PRESIDENT AND GENERAL MANAGER
NUCLEAR TECHNOLOGIES AND FUEL DIVISION
GENERAL ELECTRIC COMPANY

BEFORE THE

SUBCOMMITTEE ON NUCLEAR REGULATION
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
U.S. SENATE

ON

NUCLEAR POWER PLANT LICENSING REFORM

July 11, 1985

Mr. Chairman and Members of the Subcommittee:

INTRODUCTION

I am Bertram Wolfe, a Vice President of the General Electric Company and General Manager of its Nuclear Technologies and Fuel Division. I received a B.A. in physics from Princeton University in 1950, and my Ph.D. from Cornell University in 1955. I entered the nuclear energy field in 1955, and have been there ever since, all but two years of that at General Electric. I have worked in nearly all phases of nuclear energy, from reactor design to development of new reactor concepts. My present position includes the responsibility for all licensing activities for General Electric boiling water reactors worldwide.

I am honored to be here today to testify for General Electric on the nuclear licensing reform proposals being considered by the Senate in this watershed year. Nuclear licensing reform is of crucial importance to the future of commercial nuclear power generation, and, I firmly believe, to the future well-being of our nation. It is likely that the country's continued health and growth will require signficant additional electrical generating capacity, which I conclude should come, in substantial part, from reliance on the safe, environmentally sound source of energy which nuclear power has proven itself to be.

In order for that to happen, the nuclear plant licensing process must be untangled and generally transformed into an orderly, rational process which, ironically, nations with far less experience in this arena than the U.S. have proven it can be.

It wasn't so very long ago that this nation built safe, reasonably priced nuclear power plants in as little as four or five years. In fact, other countries are still able to do this. General Electric and Bechtel recently completed constructing two boiling water reactor plants in Taiwan in just five years each -- plants that met all of the latest U.S. safety requirements. But in the U.S., the nuclear plant construction process, including licensing, requires, on the average, ten to twelve years. The resulting interest and escalation costs create an astonishing burden for either shareholders or ratepayers to bear, with no corresponding increase in the safety of the facility. We have reached the point where no utility can order a nuclear plant with any assurance as to cost, schedule or ultimate licensability. We must restore predictability to the process.

To do this, major process reforms are needed. I am submitting for the record a prepared statement on the need for reform of the nuclear licensing process, as well as General Electric's views of what meaningful reform legislation must include. Such legislation should have five objectives:

Making the process more predictable, further increasing the assurance of safety of plants being designed and built; improving the quality of regulatory decisions; reducing unnecessary costs; and promoting more effective public participation. One key element of any reform proposal, which furthers all five of these important policy objectives, is standardization.

STANDARDIZATION

The standardization approach involves a nuclear plant supplier, an architect-engineer, or a design team including both, developing a generically applicable reactor design -- essentially complete and final in all respects important to radiological safety -- which can be used for a number of units at a number of sites. Before the standardized design was referenced in a specific facility license application, it would be thoroughly reviewed by the NRC, all safety issues resolved, and the design reviewed for application to an envelope of possible sites, rather than for one specific site. The public would fully participate in this, and final approval would take place only following a public hearing.

Thereafter, a utility electing to use the standardized design would reference it in its license application. The NRC would not repeat the review of design issues previously resolved, but would limit its review to issues relating to the suitability of the standardized design for a particular site, or any other issues not resolved in the prior design approval or early site approval proceedings. Affected members of the public would have an opportunity for a hearing on such issues. Upon establishing the compatibility of the site and the design, the NRC would authorize the utility, in a single proceeding, to both construct and -- provided the plant is constructed consistent with the design approval -- operate the plant.

THE BENEFITS OF STANDARDIZATION

Let me explain how this approach would move the licensing process toward our stated objectives:

Predictability. Standardization will permit resolution of safety issues, and understanding of their impact on costs and schedule, before a utility is required to make its multi-billion dollar investment decision on a new plant. This injects needed stability into the process, to the mutual benefit of the utilities, their shareholders and ratepayers, the NRC and public utility commissions, and the financial community.

Increased Assurance of Safety. Standardization can make an important contribution to the safety of nuclear power plants in the following ways:

- Suppliers and architect-engineers will be able to devote greater resources to a single standard design than to numerous custom designs. Similarly, the NRC will have fewer designs to review, understand, and regulate. The result: optimal allocation of safety resources.

- The commonality of operational experience, and of industry and NRC awareness of it, will result in a better understanding of operating events and their relevance to other reactors.
- Resolution of many generic safety issues will be eased by reducing the number of designs for which they must be evaluated.
- Quality assurance will be enhanced by a reduction in the number of different systems and components utilized.

Better Regulation. Standardization will decrease the number of different designs that the NRC will have to review, understand, and regulate. Standardized final designs, pre-approved for multiple future use, will eliminate the need for redundant design reviews in individual plant proceedings. Finally, standardization, coupled with single-stage licensing prior to the beginning of plant construction, will enable the NRC to resolve safety questions before, rather than after, the plant is built.

In short, standardization will enable the NRC to focus its regulatory resources with greater intensity on the most important safety questions, at the stage where it makes the most sense to do so.

Reduced Costs. Standardization will take the NRC's design review off the critical path of the licensing process and provide an essentially final design before construction begins, thereby permitting early ordering of components, and efficient scheduling and sequencing of construction. This can reduce by several years the time it takes to license and construct plants, saving hundreds of millions of dollars in capital and interest costs.

Standardization will also enable the NRC to complete its safety reviews before commencement of plant construction, avoiding the present system's continual changing of the design under construction -- a major cause of delays and consequent cost increases.

Improved Public Participation. Finally, design standardization will permit more effective public participation, since the public will have an opportunity to be heard both earlier in the process -- prior to any major utility commitment to a plant employing the design -- and with access to essentially complete and final design information.

For these reasons, General Electric believes that standardization offers a solution to the problems which render the current system unacceptably costly, inefficient, and unpredictable, and at the same time promises enhanced assurance of protection of the public health and safety.

ESSENTIAL ELEMENTS OF STANDARDIZATION LEGISLATION

To realize the benefits inherent in the standardized licensing approach, a statutory framework must exist which incorporates two principal features: single-stage licensing, and stability of regulatory approvals.

With standardization and single-stage licensing, all major issues would be reviewed and resolved, and public hearings held, prior to construction authorization. Thereafter, a public hearing would not be held at the preoperational stage unless issues arose which were not and could not have been heard at the initial hearing, or upon a showing that the plant, as built, does not comply with its license. NRC would, in any event, always have the power to take appropriate action where necessary to protect the public health and safety.

Regulatory stability of an approved design -- wherein regulatory changes should not be permitted absent clear justification for any change, measured against well-defined and systematically applied criteria -- is also essential to standardization's success. The legislation should therefore permit design approvals to be modified only in generic amendment proceedings, in which the vendor responsible for the design is a party -- not in individual reactor licensing proceedings applicable only to one licensee -- and then only where the change provides a substantial improvement in the overall protection of the public health and safety.

An important companion to one-step licensing of designs is a procedure for early site approval. Early site approval would enhance public participation by providing a hearing opportunity on the use of a site prior to a utility making a significant commitment to the site, and would remove site reviews from the critical licensing path, reducing costly delays and uncertainties in the utility's planning schedule.

THE PROPOSED LEGISLATION

Each of the three bills pending in the Congress (the NRC, the DOE, and Broyhill-Moorhead bills, the latter two of which have not yet been introduced in the Senate) contains the essential elements of authority for granting design approvals, provision for issuance of a combined construction and operating license, assurance of stability of approvals once issued, and authority for granting early site permits.

There are, however, some significant differences among the bills, differences which are covered in some detail in our formal statement. Let me briefly note two of them here. The NRC and DOE bills (but not the Broyhill-Moorhead bill) contain highly desirable provisions requiring that all inspections, tests, analyses, and acceptance criteria be specified in single-stage licenses; and the Broyhill-Moorhead and DOE bills (but not the NRC bill) contain the important provisions mentioned above requiring that amendments to design approvals be made only in separate proceedings to amend design approvals, not in individual licensing proceedings. While, as indicated, there is a remarkable consensus among the three bills on the basic concepts -- and all would significantly improve the existing licensing process -- the ultimate legislation should include both of the above provisions.

One issue that warrants special mention is the level of design detail that would be required in an application for a combined construction and operating license. That level is variously described in the three bills. All three contemplate that a far more complete design, with a far greater level of design detail, would be provided for a single-stage license than is now provided in a construction permit application. The NRC should require, and the vendors can supply, whatever information is needed to establish that the plant, if constructed in conformance with the license, will operate safely. All three bills reflect this.

THE IMPORTANCE OF CONGRESSIONAL ACTION AT THIS TIME

Congress needs to reform the nuclear licensing process now, even though, and partly because, there is no immediate prospect of new nuclear plant orders. The proposed licensing process is premised on as much as possible of the designing, planning, and regulatory review effort occurring before nuclear plants are ordered, but these efforts take years; we cannot wait until new plants are ordered to begin to plan for design standardization. More importantly, however, without needed changes in the licensing process there may not be any new orders.

CONCLUSION

Legislation to reform the present NRC licensing process is urgently needed. Any such legislation should focus on promoting design standardization, by authorizing single-stage licensing and ensuring the stability of designs once approved. The bills now before the Congress provide the opportunity to effect meaningful reform, and merit the Congress' immediate and favorable action.

TESTIMONY OF JAMES S. MOORE
VICE-PRESIDENT AND GENERAL MANAGER
WATER REACTOR DIVISIONS
WESTINGHOUSE ELECTRIC CORPORATION
ON
NUCLEAR REGULATORY REFORM

Before

THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON NUCLEAR REGULATION

JULY 11, 1985

My name is James S. Moore. I am Vice President and General Manager of the Water Reactor Divisions of the Westinghouse Electric Corporation. I wish to thank the Chairman and the other members of this committee for this opportunity to express our views on the proposed legislation to modify the licensing process. My personal experience participating in all phases of that process, including licensing and rulemaking hearings for the past 25 years, convinces me that changes similar to those being proposed are essential if the benefits of nuclear power are to continue to be available to the American public.

Westinghouse is a world leader of long standing with extensive experience in all major aspects of the nuclear business. We are in the unique position of having designed more nuclear reactors than any other reactor vendor in the world. Thus, we have accumulated the most direct experience with practically all phases of the licensing process in the U.S. and worldwide. As a result, we have a broad perspective on how licensing affects nuclear power plant design, construction, and operation. It is on this experience that I base my remarks today.

Since I last testified before this committee two years ago, significant changes have occurred in the nationwide energy forecasting picture. These changes have their root in the energy demand decline that took place from 1980 to 1982. Actual electrical energy usage for that period declined by .4 percent. This decline, exaggerated by the intense energy and electrical conservation that took place throughout the U.S. at that time, inspired a depressed forecast. Analysts tended to assume that this decline would steadily continue and forecasts to the end of the century were based on these considerations. In response to recent upswings in the nation's economy, it may be wise to amend those conservative figures.

In the period from 1982 to 1984, electrical energy consumption increased by nine percent. This upswing has some utilities seriously questioning their decisions to avoid building additional generating capacity.

An article that appeared in the June 17, 1985, Wall Street Journal efficiently sums up the concerns now facing many utilities. Mark D. Luftig, a utility analyst with Salomon Brothers, was quoted as saying the areas likely to be hit hardest by sudden increased demand are the Southwest, parts of the East Coast, and parts of the Northwest. In the New England area, according to Samuel Huntington, President and CEO of New England Electric, there may be a need for new generating capacity by 1995 in spite of his company's aggressive conservation program. Charles A. Lenzie of Nevada Power stated that new capacity in his area is justified now, but that regulatory uncertainties had to be resolved before his utility would commit to construction of any type.

In this environment where new capacity is being considered, the future of the U.S. nuclear option is vital. A study published by the Ford Foundation, "Energy: The Next Twenty Years," made the significant point that when any major energy option, such as nuclear power, is ruled out, the strain on the options that are left increases dramatically. Furthermore, none of the other conventional electrical generating options - coal, oil, hydro - is without problems of the environmental, economic or technical variety.

I want to emphasize to you that Westinghouse remains firmly committed to the future of nuclear power. Our commitment is exemplified by our involvement in the development of a new generation of nuclear power plant design - the Advanced Pressurized Water Reactor (APWR). This is a major cooperative effort with the Mitsubishi Company of Japan, one of our licensees, and a consortium of Japanese utilities. We view this as an exceptional opportunity to make evolutionary changes in design based on our many years of experience with existing PWR designs. Our goal is to develop an improved plant design which is simpler, inherently safer and more cost effective. Among the benefits which we see in the APWR are improved plant availability, reduced worker occupational radiation exposure and increased design margins.

An example of the improvements which we are designing into the APWR are changes in the emergency core cooling system which ensures that in the unlikely event of a small pipe break, the reactor core will not be uncovered. This almost eliminates the potential for release of radioactivity from the core as a result of such events, and at the same time, significantly reduces the risk of economic loss from such events.

We also believe it is necessary for a single agent to be responsible for all aspects of safety-related plant design and construction and we intend to do this. In doing this, we intend to provide an exceptional level of design and construction control using state-of-the-art computer aided engineering techniques which we pioneered in the nuclear industry in the field of piping and piping support design and analysis.

Finally, we are seeking maximum regulatory accreditation of the design and construction control process in the context of a reference standard plant. In that regard, we have initiated a major U.S. licensing program intended to lead to one-step license certification of a total final plant design. In effect, we are anticipating a favorable regulatory framework which is synergistic to our efforts. Without this underlying framework of regulatory reform to provide the certainty and stability necessary, we may lose this exceptional opportunity.

The Westinghouse commitment to the future of nuclear power can be measured in terms of both money and ingenuity. We have committed in excess of 100 million dollars to this effort alone and are in the process of obtaining more than forty new patents on unique design features. The ultimate irony of our situation is that without the types of improvements contained in the proposed legislation, important American safety technology advances will be first licensed by Japanese companies in Japan.

In large measure, incentives for the Westinghouse APWR program stem from the international marketplace and our need to remain competitive in that arena. While it is true that there is a hiatus in the U.S. with respect to new orders for nuclear power plants and many plants have been cancelled, there remains a substantial international nuclear market. We believe that the proposed regulatory reforms are essential to our ability to maintain the dominant position American suppliers have enjoyed in the international market up to now.

In order for utilities to take advantage of this improved technology to meet their generation needs, concerns such as those expressed by Mr. Lenzie of Nevada Power need to be addressed. Westinghouse strongly supports the regulatory reforms proposed by the NRC and the Department of Energy (DOE). Although the two proposals differ somewhat, each would impose much-needed discipline and stability in the regulatory process and would create an important incentive for the development of enhanced nuclear power plant designs. The discipline that would be imposed does not apply just to the NRC, but to the nuclear industry as a whole.

The incentive for developing enhanced nuclear power plant designs is dependent on provisions to control unnecessary backfitting and from provisions to process deviations that may occur during the construction phase of a project.

Based on our extensive experience in every phase of plant construction, we at Westinghouse believe discipline is needed in all phases of the process on the part of all the participants - the industry, the NRC and the interested members of the public. The proposed legislation will foster that discipline and provide the certainty and stability now lacking in the licensing process. The present Commission is attempting to modify the licensing process to the extent they can without legislation. However, the industry needs a firm base of Congressional action in order to create an environment that would enable utilities to make appropriate and forward-thinking investment decisions.

Historically, the U.S. has been a world leader in nuclear technology and the NRC has been the leader in setting safety standards and criteria. These technological leadership positions were won and maintained through vigorous technical and regulatory activities in the U.S. This, especially in the early years of nuclear development, enabled the U.S. to achieve an early lead on its international competition. We now have more commercial nuclear power plants in operation than any other country in the world. Currently there are 93 nuclear plants licensed to operate, with the prospect of this rising to approximately 120 in the next five years. This means that the cumulative U.S. experience can be expected to far exceed that of any of the international competition for quite some time. We must have a rational approach to factoring that experience into regulatory requirements if we are to expect other countries to respect our judgments.

U.S. regulatory requirements, including many of the U.S. codes and standards, were adopted virtually verbatim worldwide during the emergence of the nuclear power industry. But while everyone essentially integrated the regulatory requirements into their own regulatory system, they did not adopt the U.S. licensing process. Most countries developed their own, which appear to be more efficient, processes. Three other major nuclear-committed countries - Great Britain, France and Japan - each have a licensing procedures that solve substantive issues at the early stages of a project, employ cost-benefit backfit methodology, and provide for early public participation in a constructive, disciplined manner. This efficiency and sensibility has created environments in which nuclear plants can be constructed in half the time it takes utilities in the U.S.

At present, we see regulatory agencies in many other countries not only using their own regulatory process but also questioning, and in some cases rejecting, new NRC regulations and devising their own regulatory requirements. For example, regulatory bodies in France and Japan have not adopted all of the post-TMI requirements. Also, several countries -- including the United Kingdom, Taiwan and Korea -- have rejected low-population density siting regulations out of necessity and have relied upon the incorporation of engineered safeguards instead.

This departure from U.S. regulatory requirements is being accelerated by the inability of the NRC to incorporate the results of current safety research and development programs into its regulatory requirements. Japanese regulations for emergency core-cooling system performance allow the regulators to consider the results of research and development programs, even those conducted in the U.S. In our own country the results of these multi-million dollar programs are being ignored and requirements are frozen based on the limited research and development data that was available 13 years ago when the Emergency Core Cooling Hearings were conducted. This is in spite of common knowledge that large factors of conservatism incorporated then are no longer necessary, and especially distressing in that a simple procedural change in the regulations, suggested to the NRC by the AIF, is all that is necessary. My point is that this "backfit" issue has two dimensions. Not only does it involve the imposition of unnecessary layers of requirements, but also includes the unnecessary retention of requirements long after the need has disappeared.

The joint program with the Japanese that I mentioned earlier is an example of how pervasive this problem has become internationally. The APWR under development is being designed to meet the regulatory requirements of Japan, not those of the U.S. Of course we are reviewing it against U.S. regulatory requirements in connection with our program to obtain NRC approval for U.S. application, but for functional purposes we are applying Japanese regulations.

We need to be able to compete successfully in the international market during the current hiatus in domestic nuclear power plant orders in order to ensure our ability to respond when the domestic market returns, as I am sure it will. Furthermore, participation in the international marketplace will ensure our continued ability to be able to respond to our customer's needs for services in connection with those plants that are operating. Action by the Congress to provide the needed reforms in the regulatory process will be a strong signal to the international nuclear community that the U.S. intends to continue to be a reliable supplier of nuclear power plants and associated equipment and services and to continue its technological and regulatory leadership. While this will not by itself ensure our success in the international market, it will remove what has become a major impediment to that goal.

At this point, I would like to discuss our views with respect to each of the provisions of the legislative proposals which you are considering. Although I will be addressing each of these provisions on their own merits, it is important that you recognize that these provisions form an overall approach to the regulatory process and that achieving most of the benefits depends on the combined effects of them taken as a whole. I would also like to explain that I will be using the NRC-proposed legislation as the basis of my remarks. I will not go into any detailed review of the provisions of the proposals. That has been done by Mr. Cowan appearing here today on behalf of the AIF and we support the detailed technical changes he has recommended to this Committee.

Early Site Approval

This important provision would allow an applicant to obtain approval of sites for nuclear power plants from the NRC without committing to build a particular facility, and even before he has selected any specific plant design. We support this proposal. Combining this provision with an allowance for preapproved designs would significantly enhance a utility's ability to obtain permission from the NRC to begin construction because most of the major decisions necessary for such permission would already have been made. Thus adoption of this provision will enhance regulatory stability and predictability.

Approval of Designs

Preapproved plant designs, particularly if utilized in connection with preapproved sites and protected from unnecessary backfitting, have the potential to greatly reduce the cost and time required to bring nuclear power plants on line and are, therefore, a significant benefit to the public interest. Emphasis on standardization, to limit the number of different designs requiring review and approval and to avoid unnecessary rereview and relitigation of issues, is of obvious benefit to utilities and consumers as well as to the nuclear industry.

Nuclear power plants, TMI notwithstanding, have demonstrated an exceptional record of economic and safe operation. This does not mean, however, that there cannot or should not be further improvements. It must be recognized that any regulatory process has a built-in bias favoring the status quo. Once regulatory approval has been obtained for some activity, there is a strong disinclination to do anything to upset that approval and require rereview. The more cumbersome and uncertain the regulatory process, the greater is the disincentive. On this basis alone, we believe that the regulatory reforms being proposed have considerable potential for making improvements. It is very important, in considering legislation to improve the regulatory process, that we eliminate, wherever possible, existing stumbling blocks and to avoid creating new ones.

Licensing Stability

No one could be opposed to backfitting when the expenditure of time and resources for such actions are justified on the basis of the overall benefits to public health and safety. On the other hand, the absence of a rational evaluation process prior to imposing backfits and the adverse, cumulative effect of multiple backfits, should be a concern. We are especially concerned that many backfits do not contribute to, and may in fact have detracted from, overall plant safety. More information on this is available in the pertinent section of the President's Private Sector Survey on Cost Control, and NRC report NUREG-0839.

In NUREG-0839, the NRC's own senior management conducted a study of backfitting reported in 1981. They found that many of these new requirements had not been adequately evaluated as to their impact on public health and safety overall. The study also found that the multiplicity of new requirements placed large numbers of workmen in operating plants. This causes an increased opportunity for error and unintentional operational transients. The NRC senior management also found that frequent and numerous modifications resulted in a continued need for retraining operators, which prevented the operators from developing a reliable base of experiences upon which they can rely during plant operations. The primary recommendation of this report was for the NRC to take prompt action to bring the issuance of new requirements under better control.

Examples of improper backfits, as well as debates over their efficacy, tend to detract from the larger question of public interest. The NRC itself admits that it does not know whether or not the majority of required backfits provided overall safety benefits, because no evaluation was performed. More importantly, the cumulative effects of backfitting, the diversion of limited resources from other activities important to overall safety, and the indirect adversities of backfitting are never evaluated. We estimate that $3 billion has been spent to backfit 41 plants, which represents 25% of the initial cost of these plants. Considering this huge total cost incurred by utilities and imposed on ratepayers, the current process clearly is not in the public interest.

The experience of the last decade indicates that the NRC needs a clear expression of support from the Congress to initiate reform of the backfit process. Westinghouse supports the inclusion in any licensing reform bill of specific backfitting provisions setting forth the standards the NRC should use and specifying the factors the NRC should consider in its evaluation of proposed backfits. The DOE proposal includes such provisions, and although we may differ with certain language in the DOE bill, we generally support its recommendations. The NRC bill provides for regulatory stability only in connection with the combined construction permit and operating license, site permits and design approvals which would be authorized by that bill. We also support the NRC provision, but do not believe it goes far enough in directing the Commission in this important area.

One-Step Licensing

An important feature of the licensing reforms proposed by both the NRC and the DOE is a provision for one-step licensing. This improvement would, in itself, go a long way toward reforming regulatory process. It will provide, moreover, for increased public participation in the nuclear licensing procedure.

I would especially like to emphasize the relationship between standardization and one-step licensing. The proposed legislation provides for standardization in its provision for pre-approval of designs. For such pre-approval to be effective, however, it should be coupled with a one-step licensing process. When a standardized design has been approved, it is essential that those items relating to the design and the public health and safety not be subject to reconsideration after the standardized plant has been constructed and the large investment made. A complete review, with meaningful public participation, should be required at the front end of the process. Thereafter, the benefits of standardization can accrue only if the license constitutes such approval to construct and operate the plant.

The current process satisfies no one. Although it provides two opportunities for public hearings, it actually foreshortens public participation when compared to the proposed one-step format. The construction permit hearing occurs too early to adequately evaluate the safety of the proposed facility and the operating license hearing is too late since it takes place after the plant is almost entirely constructed and billions of dollars have been invested. The length of time that currently exists, from the time a facility is planned until the time it becomes operational, needlessly adds hundreds of millions, if not billions, of dollars to the cost of a plant. And I do not hesitate to add that the consumer ultimately pays this cost in electrical bills. These avoidable delays are caused in part by the licensing process and the threat of activating dilatory, undirected, obstructive litigation encouraged by the existing process. There are three significant disincentives to the provision of detailed design information in the existing process: (1) the added expense in terms of cost, time and resources which it would take to submit a detailed design prior to the issuance of the construction permit; (2) the essential meaninglessness of submitting such information given the substantial likelihood that the NRC would order major modifications to that design once construction began; and (3) the possibility that the design would be relitigated at the operating license stage anyway.

I believe that industry would be willing to undertake the expense of submitting a more detailed design earlier in the process if it could be assured that its consideration would be meaningful, as it would be under the one-step format. My conversations with utility executives confirm this view. The significant advantage of the one-step process for utilities is permitting them the opportunity to plan for the future with confidence. Under the current regulatory process, a utility ordering a nuclear plant does not know how much it will cost, or how long it will take to complete, two factors which, I might add, are interrelated. The longer it takes to build the plant, the more it will cost since the debt incurred will have to be financed over longer periods of time. For a plant nearing completion at the current time, interest charges alone are more than a million dollars a day.

In my testimony to this subcommittee two years ago, I described the discipline which the DOE proposal for one-step licensing then under consideration would bring to the licensing process. I have included that description to this testimony as Attachment A. The description contained in my earlier testimony is equally applicable to both the proposed NRC and DOE bills which are the subject of this hearing.

The public would benefit greatly from a single early hearing on an essentially complete reactor design. Those who participate in the licensing process would have the opportunity to review a design for which all safety related requirements have been defined, yet before billions of dollars have been spent on the facility and significant changes in the plant are difficult, if not impossible, to make. Consumers generally would benefit from less expensive plants. Not only would the plants cost less because of the fewer number of backfits which would be required during construction, but the plant would become operational more rapidly, thereby significantly reducing the time during which interest would have to be paid on the debt incurred to build it. Consumers also would benefit from the added assurance of access to adequate electricity supplies at reasonable rates to support regional economic growth.

Westinghouse believes so strongly in the benefits of a one-step process that we have initiated with the NRC a major licensing program to lead to one-step certification of the Westinghouse Advanced Pressurized Water Reactor. Once this certification is complete, utilities will be able to provide the NRC with an essentially complete design at the beginning of the licensing process.

Under the proposals contained in both the NRC and DOE bills, an applicant receiving a combined construction permit and operating license would have to satisfy a comprehensive list of requirements--consisting of tests, inspections and analyses each with a specific acceptance criteria--before the plant could be placed into operation. There is a sound basis for concluding that the issues of emergency planning, management ability and operator training can be dealt with in this context. Indeed, the early resolution of these issues would seem preferable. The time to determine whether emergency planning is feasible for a specific site is prior to the time billions of dollars have been spent. Likewise, the ability of a utility to manage the project should be concluded as early in the process as possible. If deficiencies in these areas are found later, the NRC and the public will have ample opportunity to deal with the situation.

Does this process significantly curtail public participation? On the contrary, we believe it would enhance public participation. The inspections, tests, and analyses, and the related acceptance criteria will be considered during the hearing on the combined construction permit and operating license, and will be included within the license. Thus, the public will have an opportunity to participate when the participation would be most meaningful. The public will, furthermore, retain the right to utilize Section 2.206 of the Commission's regulations, which permits it to raise issues before the Commission in the absence of an ongoing licensing proceeding. At the current time, public participants--aside from using Section 2.206--must wait to raise these issues until the operating license is issued, which usually is too late to meaningfully address responsible issues. In addition, the public's right to participate in this early hearing means they can influence the comprehensive list of requirements which must be met before the plant will be placed into operation. I would suggest this gives public participants greater ability to affect the design of the facility than they have under the current process.

Conclusion

One of the things I have emphasized in my remarks is the importance of regulatory reform now if we are to maintain the American position in the international nuclear market. Before I conclude, I want to give you some figures which illustrate the overall importance of the international market to the American public in terms of employment. A single nuclear power plant export award represents approximately 15,000 man-years of direct employment plus another 15,000 man-years of indirect employment spread over a 6 or 7 year design and construction period. Over the lifetime of the plant after it goes into operation, as many as 30,000 man-years of additional employment may be provided through the supply of replacement fuel, components and technical services. This means jobs for engineers, technicians, factory workers and construction workers. It would be a shame to let this opportunity to increase employment opportunities for American workers slip away through inaction.

In conclusion, for all of the reasons I have stated, we support the NRC and DOE proposals with the changes recommended by the AIF and those which I have suggested in my remarks. We respectively urge you on this Committee to recommend these proposed changes to the full Committee and Senate and to use your good offices to work for their passage into law. I want to thank you again for this opportunity. I would be pleased to respond to any questions you may have at this time.

EXCERPT FROM TESTIMONY OF JAMES S. MOORE OF JUNE 14, 1983

Let me briefly describe the degree of discipline the DOE proposal brings to the process, how it actually increases the ability of representatives of the public interest to participate in a more meaningful way and why there should be no need for an automatic opportunity for a public hearing when the plant is ready to go into operation - a time when the costs of unnecessary delays are staggering. To assist you in following what I am about to say I have attached at the end of my statement five sheets (A-1 through A-5) which diagram the proposed one-step licensing process and the proposed deviation procedure. For convenience, I have divided the overall one-step licensing process shown on sheet A-1 into three phases - the initial licensing phase, the construction phase and the operating phase.

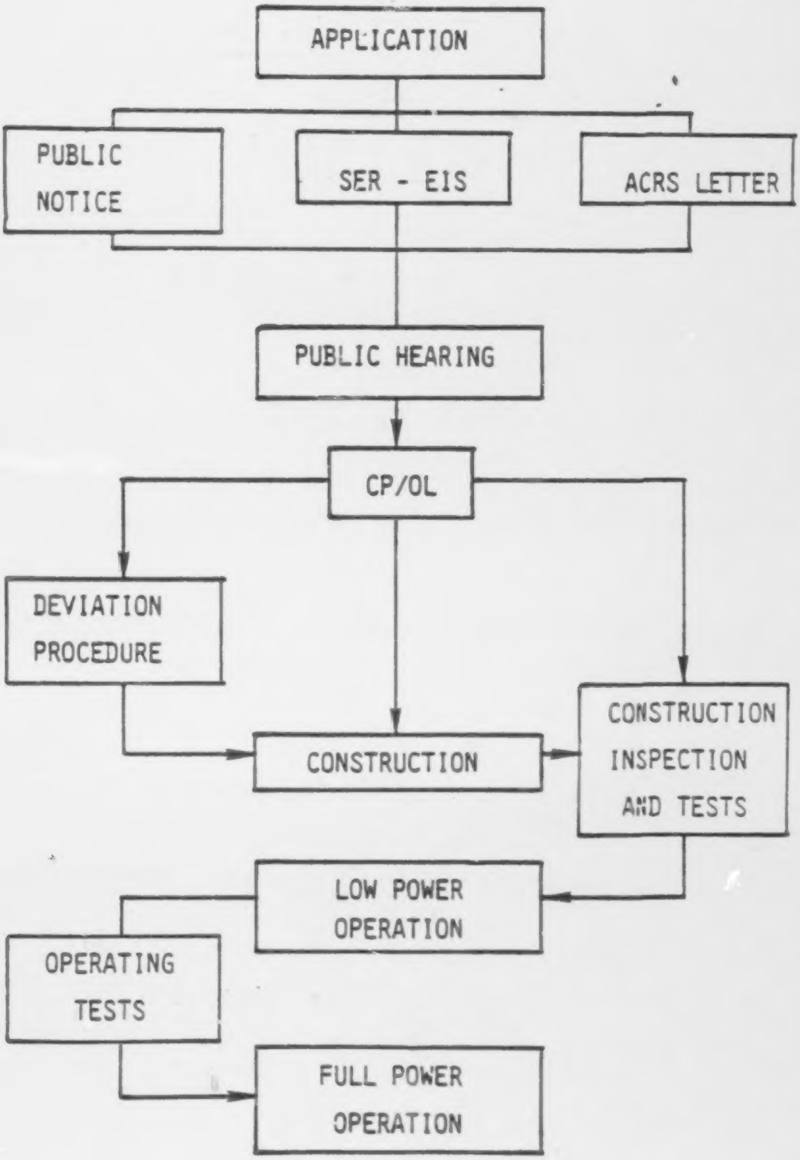
In the initial licensing phase shown on sheet A-2, the process is essentially the same as the current construction permit phase of the two-step process. However the substance of the proceeding is dramatically different. First, the final design would be defined in the application. Second, those inspections, tests and analyses that must be performed to confirm construction compliance to the license are identified. Third, for each inspection, test and analysis thus identified, the specific acceptance criteria to be met to provide assurance of proper construction would be established. Fourth, all of these - essentially a checklist of what must be done to ensure that the plant is properly constructed - would be subject to NRC staff and ACRS review followed by an opportunity for public hearing and would be included in the CP/OL. The same process is equally applicable to facility operational requirements such as emergency planning, management structure, training, etc.

During the second or construction phase shown on sheet A-3, packages of supporting data would be maintained available for NRC inspection to show that the inspections, test and analyses have been performed and the acceptance criteria have been met. The licensee would review any deviations from the CP/OL and obtain prior approval from the NRC if the deviation were not corrected and if it involved an unreviewed safety question or a change in the technical specifications contained in the CP/OL. The opportunity for public hearings on the deviations approved by the NRC would be governed by the Sholly amendment procedures. Any changes in the required inspections, tests or analyses as a result of the review of these deviations would be identified and approved in this process.

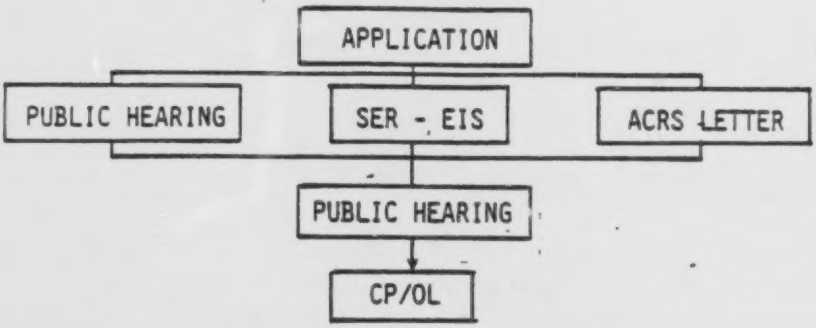
The deviation procedure, described on sheet A-4, is self explanatory. I will only say that it closely parallels the procedure now utilized in making changes to a plant that is already operating.

At the final or operating phase shown on sheet A-5, the licensee would certify the completion of his checklist. Any open items would be resolved by the licensee with NRC inspection and enforcement. When the completion of the checklist is confirmed, plant operation would commence beginning with a low power testing and escalation to power program culminating in a plant acceptance test at full power. At the completion of this program, absent any Commission action to limit or delay operation, either on its own motion based on differences in the results of inspections, tests and analyses from the pre-established approved acceptance criteria or upon a request for action under the Commission's regulations (10 CFR 2.206), commercial full power operation would begin.

OVERALL CP/OL PROCESS


APPLICATION
PUBLIC NOTICE
SER - EIS
ACRS LETTER
PUBLIC HEARING
CP/OL
DEVIATION PROCEDURE
CONSTRUCTION
CONSTRUCTION INSPECTION AND TESTS
LOW POWER OPERATION
OPERATING TESTS
FULL POWER OPERATION

INITIAL LICENSING PHASE



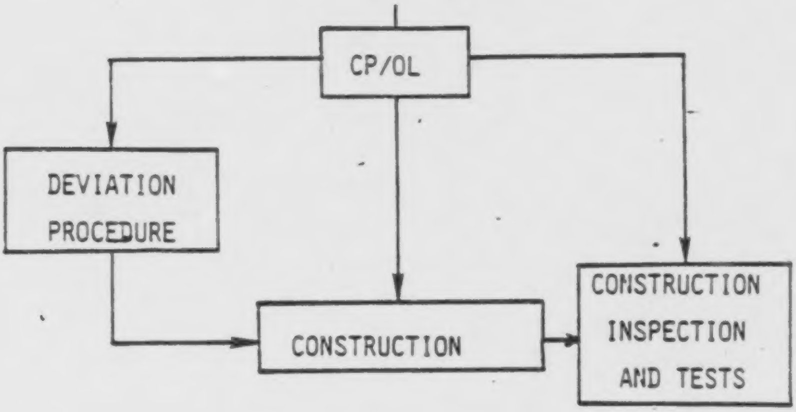
- DEFINE THE DESIGN, EMERGENCY PLAN, MANAGEMENT STRUCTURE ETC. OR DETAILED CRITERIA FOR THOSE ASPECTS WHICH CANNOT BE SUFFICIENTLY DESCRIBED AT THIS STAGE.

- ESTABLISH THE INSPECTION, TESTS AND ANALYSES TO BE PERFORMED TO CONFIRM THAT PLANT AS CONSTRUCTED, THE EMERGENCY PLAN, THE MANAGEMENT STRUCTURE, ETC. CONFORM TO THE TERMS OF THE CONSTRUCTION AND OPERATING LICENSE (HENCE CONFORM TO THE REQUIREMENTS OF THE ACT AND THE COMMISSION'S REGULATIONS)

- FOR EACH INSPECTION, TEST AND ANALYSIS REQUIRED, ESTABLISH THE SPECIFIC ACCEPTANCE CRITERIA TO BE MET TO PROVIDE ASSURANCE OF PROPER CONSTRUCTION, ADEQUATE EMERGENCY PLANS, ADEQUATE MANAGEMENT STRUCTURE ETC.

- THE MATTERS COVERED ABOVE WOULD BE CONSIDERED AT THE CONSTRUCTION AND OPERATING LICENSE HEARING AND WOULD BE INCLUDED IN THE LICENSE (CP/OL)

CONSTRUCTION PHASE


CP/OL
DEVIATION PROCEDURE
CONSTRUCTION
CONSTRUCTION INSPECTION AND TESTS

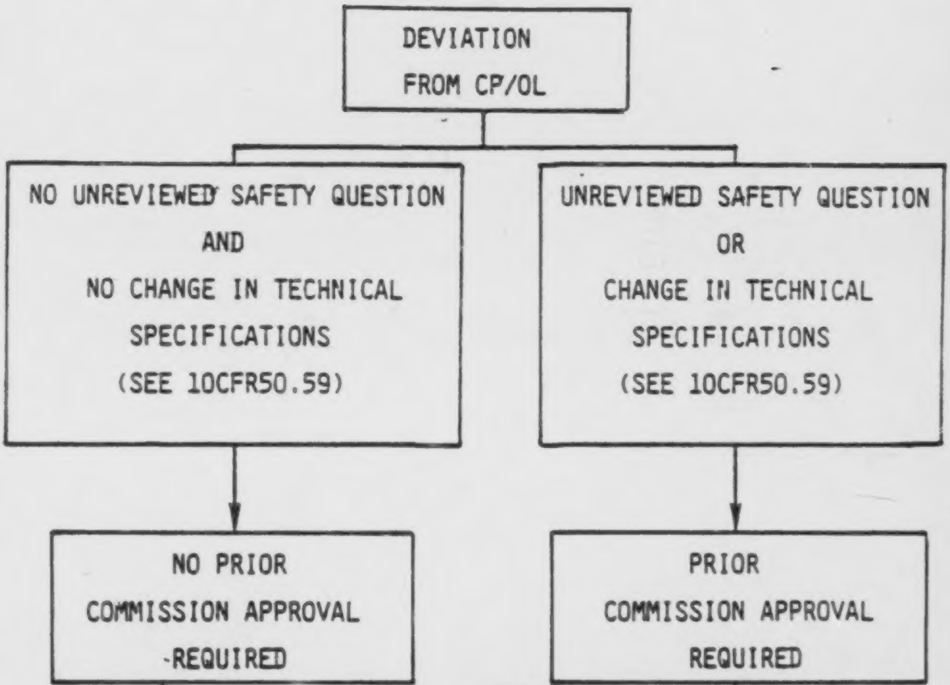
- PACKAGES OF SUPPORTING DATA MAINTAINED AVAILABLE FOR INSPECTION BY THE NRC TO SHOW THAT THE INSPECTIONS, TESTS AND ANALYSES HAVE BEEN PERFORMED AND THAT THE ACCEPTANCE CRITERIA HAVE BEEN MET.

- LICENSEE REVIEWS DEVIATIONS FROM CP/OL. OBTAINS PRIOR COMMISSION APPROVAL IF CHANGE IN TECHNICAL SPECIFICATIONS OR UNREVIEWED SAFETY QUESTION IS INVOLVED (NOTE: THIS TREATS CP/OL IN THE SAME MANNER AS 10CFR50.59 TREATS CHANGES, TESTS OR EXPERIMENTS IN OPERATING PLANTS).

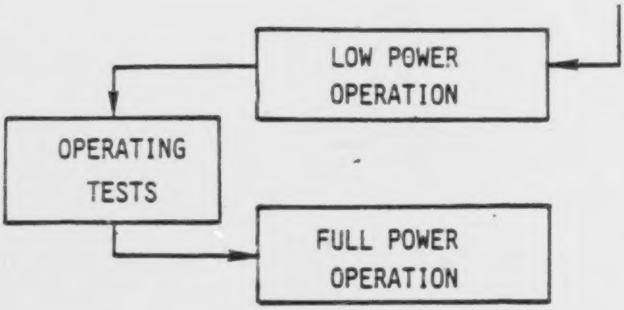
- OPPORTUNITY FOR HEARINGS - THIS WOULD BE GOVERNED BY SHOLLY AMENDMENT TYPE PROCEDURES.

- INSPECTIONS, TESTS AND ACCEPTABLE CRITERIA WOULD BE MODIFIED AND APPROVED IN THIS PROCESS.

DEVIATION PROCEDURE


DEVIATION
FROM CP/OL
NO UNREVIEWED SAFETY QUESTION
AND
NO CHANGE IN TECHNICAL
SPECIFICATIONS
(SEE 10CFR50.59)
UNREVIEWED SAFETY QUESTION
OR
CHANGE IN TECHNICAL
SPECIFICATIONS
(SEE 10CFR50.59)
NO PRIOR
COMMISSION APPROVAL
REQUIRED
PRIOR
COMMISSION APPROVAL
REQUIRED
LICENSEE
MAINTAINS
RECORD OF BASIS
SIGNIFICANT
HAZARDS
CONSIDERATION
NO SIGNIFICANT
HAZARDS
CONSIDERATION
30 DAY NOTICE
NOTICE OF
IMMEDIATELY
EFFECTIVE
APPROVAL
HEARING IF
REQUESTED
DISCRETIONARY
HEARING
CONSTRUCTION
AND
CONSTRUCTION INSPECTIONS
AND TESTS

OPERATING PHASE


LOW POWER OPERATION
OPERATING TESTS
FULL POWER OPERATION

- LICENSEE CERTIFIES COMPLETION
- INSPECTION AND ENFORCEMENT RESOLVES OPEN ITEMS
- COMMISSION ACTION TO LIMIT OR DELAY OPERATION
    - ON OWN MOTION BASED ON DISCREPANCIES IN INSPECTION AND TEST RESULTS FROM PRE-ESTABLISHED ACCEPTANCE CRITERIA
    - REQUEST FOR ACTION UNDER 10 CFR 2.206

STATEMENT OF SHELBY T. BREWER

SENIOR VICE PRESIDENT
COMBUSTION ENGINEERING, INC.

BEFORE THE
SUBCOMMITTEE ON NUCLEAR REGULATION
OF THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

JULY 11, 1985

Thank you, Mr. Chairman, for the opportunity to appear before this Committee as it considers legislation on nuclear licensing and regulatory reform.

I am Shelby T. Brewer, Senior Vice President, Combustion Engineering, Inc. Combustion Engineering is a major supplier of electrical generating systems -- both fossil-fired and nuclear -- oil and gas refinery systems, other major chemical processing systems, and industrial process control systems. We serve markets here in the U.S. and around the world.

My principal responsibility is the management of the Nuclear Power Systems Division of Combustion Engineering. Combustion Engineering designs and manufactures complete nuclear reactor systems, including nuclear fuel. We also provide continuing engineering services to owners of our plants as well as to the owners of equipment supplied by our competitors.

The Need to Standardize the Product and the Process

As you know, Mr. Chairman, civilian nuclear power was developed and demonstrated in the 1950s and early 1960s, following President Eisenhower's initiatives in 1953-54. The technology was deployed rapidly and aggressively in the late 1960s and early 1970s. Since the mid-1970s, however, commercial nuclear power has been in a "recession". Over one hundred plants have been cancelled or deferred and the order rate for new capacity has dropped from over twenty units per year to zero.

To place the need for licensing and regulatory reform in context, I believe that it is important to enumerate the complex and inter-related factors which have led to this "nuclear recession":

- A downturn in the growth of electrical demand in the 1970s, which left utilities with excess capacity under construction.
- A prolonged period of high inflation and high interest rates.
- Utility difficulties in forming capital for new or ongoing construction programs, resulting from unfavorable rate constraints and the retrenchment of the financial community.

- An antiquated, chaotic and unpredictable nuclear licensing and regulating system --- a system which added construction scope and prolonged schedules in a period of high inflation and high cost of money.

- Lack of public and political support.

- Utility management difficulties in absorbing a new, largely unstandardized, technology in the face of this bewildering array of institutional maladies.

My point, Mr. Chairman, is that, although the technology has performed well, the institutional structure -- the labyrinth of entities which supply, operate, finance and regulate the enterprise -- has not. And the regulatory apparatus, while it is not the only malefactor, is certainly a dominant one.

We are faced with a situation where a perfectly sensible and necessary energy option may be denied further deployment in the United States. While there is time, we must take steps to standardize the product and the process, and to reform and improve the practices of the regulated and the regulators.

The nuclear industry is moving on its own to standardize the product. For example, Arizona Public Service Co.'s Palo Verde Unit #1 has recently been licensed to operate by the Nuclear Regulatory Commission after it referenced a pre-approved Final Design Approval held by Combustion Engineering - the first time this procedure has been used in the United States! Prior to unanimously voting the 100% Power License, the NRC Commissioners praised the project, calling Palo Verde "the plant of the future" and representing "the wisdom of the standardization approach."

Another example of the industry moving on its own to standardize the product is the Advanced Light Water Reactor Program being conducted by the Electric Power Research Institute. The program's objective is to prepare standard specifications for the design of the next generation of nuclear reactors in the United States. Combustion Engineering is pleased to be a leading participant in that program.

Standardization of the licensing process, however, calls for action by Congress. Although the Nuclear Regulatory Commission could implement most, if not all, of the proposed reforms on its own, the U.S. utilities believe that such changes must have the support of Congress and the strength of law before they can again consider investing billions of dollars in the nuclear option.

The current nuclear regulatory process and apparatus was established over thirty years ago to meet the requirements of a time when the technology was developmental and when applications for permits and licenses were few, if any. The 1954 Atomic Energy Act has been revised from time to time, but its basic structure with regard to licensing is antiquated and is not appropriate for a major energy industry.

Licensing and regulatory reform is necessary for the continued viability of a nuclear economy in the United States and it is necessary to sustain and enhance the excellent public health and safety record of this technology. These are not mutually exclusive goals.

There is a popular notion that the various forms of legislation being proposed will somehow yield profit for the nuclear sector at the expense of public health and safety -- that streamlining the regulatory process will short-change public health and safety considerations and, further, that it will frustrate public participation in the regulatory process. Nothing could be further from the truth.

In reality, the current legislative proposals will make public participation more effective by encouraging public input early in the licensing process, before the momentum of a massive sunk investment clashes with public concerns voiced late in the process. Moreover, under the Standardization and Construction and Operating License (COL) provisions, there will be essentially complete designs to provide the basis for public review, as opposed to the current piecemeal "design-as-you-go" process in which construction permits are sought with as little as 20% of the design complete (and that subject to change). Making societal decisions up front, under the standardization, siting, and COL provisions of the proposed legislation, serves all parties in the regulatory process -- the public, the ratepayers, the utilities, and the financial community.

At the heart of our current problem is the heterogeneous and pluralistic way we have deployed nuclear power in this country. There are over 80 operating nuclear units in the U.S. and by and large they are unique: custom designed, custom manufactured, custom constructed -- and custom regulated. We have not availed ourselves, to any appreciable extent, of the very major economies and safety benefits afforded by standardization of subsystems or of complete plants. The standardization provisions of proposed legislation serves both the needs of the business community for more regulatory stability and the maintenance of our excellent record in public health and safety. Public health and safety goals are better served by focusing the regulator's technical resources on fewer standardized plants or systems, rather than a plethora of individualized designs.

The public health and safety goal is served also by requiring a more disciplined and systematic process for imposing retrofits in operating plants or plants under construction. A major concern with the current process is that a retrofit requirement in a subsystem may actually adversely impact the safety of the plant as a whole, and that the sheer accumulation of undisciplined retrofit requirements may lead to less, not more, safety.

Whatever one's persuasion is as to the efficacy of nuclear power, there seems to be a vast and growing broad based consensus that licensing reform is necessary to maintain and enhance the excellent public health and safety record of this technology. In the past half-decade, several panels have been convened to consider the nuclear licensing issue. These panels were not known for their knee-jerk, pro-nuclear positions on the issue. For example, President Carter appointed the Kemeny Commission after the Three Mile Island accident. A principal finding of the Kemeny Commission was:

> "To prevent nuclear accidents as serious as Three Mile Island, fundamental changes will be necessary in the organization, procedures and practices -- and above all -- in the attitudes of the Nuclear Regulatory Commission ... "

Similar or even more pungent conclusions came out of the Babbit Committee, the Rogovin Study, and a host of other inquiries.

Even the regulators have concluded that the escalation of undisciplined regulation may lead to less, not more, public health and safety:

> "It is the finding, notwithstanding the competence and good intentions of the staff, that the pace and nature of regulatory actions have created a potential safety problem of unknown dimensions."*

In the past year, the Commissioners themselves have underscored this sentiment in Congressional hearings.

The nuclear regulatory process is unstable, unpredictable, and out of control. This condition is not only debilitating to the business and technical sectors -- it may be harmful as well to sustaining the excellent record of public health and safety that this technology has achieved. Reform is needed. Reform is needed to enhance the excellent safety record as well as to reverse the retrenchment of the business community. Reform is a win-win, not a win-lose proposition.

---

* Nuclear Regulatory Commission Report, 1980

Is Reform Needed Now?

But is reform needed now? Is it an urgent problem? With a dearth of new applications, can't this issue wait?

Clearly we have a lull in licensing activity. The NRC case load is down. I believe, Mr. Chairman, that Congress should use this slack period to constructively reform and standardize the licensing process, free from the heat and pressure that a full NRC docket would bring. We have some time to perfect the process and this time should be used preciously.

Moreover, without nuclear licensing and regulatory reform legislation, it is unlikely that the utilities and the financial community will step up again and place major investments at risk. Absent reform legislation, nuclear power will not be available as an option for new generating capacity.

Therefore, time is precious. Some regions of the country (particularly the Northeast) will see reserve margins for electrical generating capacity drop below normally acceptable levels as early as 1991. Given the construction lead times involved, it may already be too late to avoid brownouts in some areas of the country in the early 1990s.

The revitalization of the economy in the last four years has restored electrical demand growth. And while the new demand growth rates are a modest 3-4% per year in the context of robust historical rates of 7%, the new growth rates require that we double current capacity in something just over 20 years, to say nothing of replacing retiring capacity. This may sound like a long time, but given the lead times involved it is not unreasonable to begin our planning now. Coal and uranium are the two options for bearing the lion's share of the burden for new capacity. Without a modernized regulatory system, uranium drops out as an option.

The present capacity overhang buys us this time to modernize the nuclear regulatory system, free from pressures and acrimonies. There is some time for each of the parties -- the utilities, their suppliers, the financial community, the public, the regulators and the Congress -- to take stock, to define their respective responsibilities and their respective requirements, and to design a regulatory process which serves all of this nation's interests.

Therefore, Mr. Chairman, your efforts to craft intelligent legislation -- carefully and deliberately -- are timely.

The Key Features of Legislative Reform

A great deal of study and debate has gone into the subject of nuclear licensing and regulatory reform. Several legislative proposals, in fact, were made in the early 1970s by then-Commissioner James Ramey. Another Bill was prepared in 1978 by the Carter Administration. The Reagan Administration offered legislation in 1983, and it was my privilege, as Assistant Secretary of Energy, to represent that legislation before Congress. The Nuclear Regulatory Commission also proposed legislation in 1983. Hearings were conducted in both chambers of Congress in 1983.

Early this year Congressman James Broyhill proposed legislation in the House, and this was followed by a similar proposal by the Department of Energy in May. A Nuclear Regulatory Commission proposal was submitted in March. Each of the 1985 proposals deal in slightly different ways with the filigree of four basic elements:

- Plant or subsystem standardization;
- Pre-approval of nuclear sites;
- Single step licensing -- the option of a combined Construction and Operating License (COL); and
- A coherent retrofit process.

I would like to take this opportunity to offer my views on each of the above features as they are addressed by the current legislative proposals from the Department of Energy and the Nuclear Regulatory Commission. First, however, I would like to comment upon the similarity of the two proposals. The current proposal from the Department of Energy is a "stripped down, no frills" version of the 1983 Reagan Administration Bill. It contains the minimum features necessary to streamline the nuclear licensing process. The most notable feature of the 1983 proposal that is not included in the 1985 model is the hybrid hearing process -- which was the source of considerable controversy during the 1983 hearings.

The current proposal from the Nuclear Regulatory Commission has been considerably reworked from its 1983 version and, in my opinion, vastly improved. There is now enough similarity between the two proposals (and the third proposal submitted by Representative Broyhill, with bipartisan support) that I am confident that Congress can quickly and efficiently move the Bills through markup and develop a single Bill that can be enacted during this session.

My views on the key features of these proposals are as follows:

Standardization:

Both proposals direct the Commission to establish procedures to pre-approve standard designs for nuclear plants. They also provide the opportunity for public involvement in the licensing of standard designs. Public participation, as early in the licensing process as possible, benefits everyone -- the public, the Nuclear Regulatory Commission and the nuclear industry. To assure stability (by assuring finality), however, final Commission decisions must not be reopened by insignificant and/or unfounded safety concerns during the construction or operation of a nuclear plant. Both legislative proposals provide a reasonable system for addressing any new safety issues.

There are a number of provisions in the Administration's proposal, however, that provide a necessary degree of flexibility. For example, the Administration's proposal directs the Commission to allow pre-approval of major subsystems in a plant design. This is an important flexibility that should be provided if we are to balance the advantages of standardization with those that derive from competition within a free market. And this flexibility need not auger a custom, one-of-a-kind future.

Pre-Approval of Sites:

Both proposals provide for the early approval of a nuclear plant site, in a process similar to pre-approval of standardized designs. Again, both provide for early public participation, with a system for resolving new safety issues that may arise later in the licensing process.

Single-Step Licensing:

Both proposals provide for issuance of a single license to construct and operate a nuclear plant. The single license assures that all significant safety issues are resolved prior to beginning construction, that is, prior to major financial commitments. Regulatory emphasis during construction would be placed on assuring that the plant is erected as per the licensed design, as opposed to participating in a design-and-regulate-as-you-go relationship with an applicant. Once more, both the DOE and NRC proposals provide for early - and more meaningful - public participation.

Retrofits:

The Administration's proposal provides a system by which the Commission may evaluate retrofits to licenses already issued by the Commission. Please be assured that I am not calling for the removal of the ability of the Nuclear Regulatory Commission to require needed safety improvements. We in the industry have, rather, been requesting a rational and disciplined system for evaluating proposed changes to determine which should be required and which not. Although the NRC's Committee to Review Generic Requirements, headed by Mr. Stello, has made great strides in the past few years, the system now in force does not involve a systematic, disciplined review of proposed retrofit requirements. By systematic, I mean an evaluation of retrofits in one part of the plant as they may affect the safety performance in another, or indeed, the safety performance of the entire plant. This defect in the current process -- in addition to adding scope, schedule, and cost to a project -- may, in fact, lessen the project's overall safety. NRC officials themselves appear to have recognized the problem of cascading retrofits -- most notably Mr. Dircks, Mr. Stello, and Mr. Tourtellotte.

I must emphasize that the retrofit feature is vital to the success of the entire package. An approval on a standard design would be meaningless if it were continously retrofitted without restrictions. I believe that control of retrofitting is, in fact, the litmus test for standardization and I consider the lack of a retrofit provision in the Nuclear Regulatory Commission proposal to be a major flaw in assuring stability to the licensing process.

Hybrid Hearings:

Although the 1983 Reagan Administration bill sought to simplify the hearing process through the use of hybrid hearings, neither of the current proposals seek such a change. Instead, they focus on providing early public participation and assuring that tests of reasonableness are considered before new issues are admitted to hearings late in the process. Assuming that these features remain in the legislation and achieve the desired goals, then the format of the hearing process becomes less important.

Summary

Permit me, Mr. Chairman, to summarize my remarks as follows:

- Modernization of the nuclear licensing and regulatory process is necessary to preserve a vital energy option, and to sustain and enhance the nuclear industry's excellent safety record; both objectives are served by reform legislation.

- The public health and safety goal is served:

    - by focusing the nation's technical resources (both in industry and in the regulatory body) on fewer, standardized plants or subsystems, as opposed to squandering our technical resources on a plethora of custom designs;

    - by more effective public participation, early in the process before major financial resources are committed, and public participation with essentially complete designs and siting proposals in hand; and

  - by a more systematic review of retrofit proposals to assure that net overall plant safety is enhanced, not degraded, by such proposals.

- The interests of investors, the utilities, and the suppliers will be served by a more stable regulatory environment; and, again, the public will benefit, from lower energy prices;

- Congress should make use of the lull in NRC case load to perfect the licensing and regulatory process, rather than wait for a future in which pressures constrain reason or, worse, a future when remobilization of nuclear energy is no longer an alternative. The time for deliberate, careful Congressional consideration is now.

- The major outlines of the bills before Congress now are quite similar, differing only in emphasis and refined accommodations of checks and balances; debate over the past few years has served to converge the various proposals; therefore, I believe that Congress can efficiently move legislation through markup and develop a single bill that can be enacted during this session.

Testimony to Subcommitte on Nuclear Regulation of the Senate Environment and Public Works Committee

By W. Kenneth Davis, Bechtel Power Corporation
8 July 1985
Washington, D.C.

NUCLEAR POWER PLANT LICENSING AND STANDARDIZATION

My name is Kenneth Davis. I am an independent consultant on management and engineering, representing Bechtel Power Corporation in providing testimony to the Subcommittee. I served as Deputy Secretary of Energy from 1981 until early 1983. Prior to that I served as a corporate vice president of Bechtel Power Corporation and its predecessor companies for nearly 23 years and now serve them as a Consultant. Before that I was Director of Reactor Development of the Atomic Energy Commission. At the present time I am Chairman of the U.S. Committee for the World Energy Conference and Vice Chairman of the international organization. I have served as Vice President of the National Academy of Engineering, President/Chairman of the Atomic Industrial Forum, and President of the American Institute of Chemical Engineers. I am a Director of the Management Analysis Company and of the Atlantic Council.

Bechtel Power Corporation is one of several operating subsidiaries of the Bechtel Group, Inc., of San Francisco, California. The Bechtel Group and its constitutent companies provide engineering, procurement, construction, and construction management services for major industrial facilities on a world-wide basis. Bechtel Power Corporation provides these and related services for electric power generating facilities including nuclear but not hydroelectric, which is handled by another subsidiary. Bechtel has had major design and or construction responsibility on over 40% of the nuclear power plants currently operating in the United States and nearly 30% of the overseas plants on which American firms have been involved. This experience included pioneer projects such as EBR I, Dresden I, San Onofre I, Big Rock Point, and Peach Bottom I. This experience allow us to speak with some authority on the subject before the Subcommittee today.

I would like to confine my comments to the role of licensing of new nuclear power plant projects. I would like to explain why we believe this subject is urgent as well as important and then outline some of the considerations which we believe are critical in considering legislation in this area.

We believe that it is urgent that an improved licensing process for new nuclear power plants be established very soon.

One point which seems to have been lost in all of the discussion about the state of the nuclear industry is the overriding fact that no new nuclear power plants have been ordered and built since 1974, and very few fossil-fired plants have been ordered in the same time period.

This resulted for a simple reason -- new capacity has not been needed. Those nuclear units ordered subsequent to 1974 were all cancelled or deferred along with about half of those on order at the end of 1974 -- which is not surprising since when the electricity growth rate dropped from 7% per year to less than 3% about half of the capacity on order, most of it nuclear, was not necessary in any reasonable time frame. Utilities had ordered these plants to provide sufficient lead time to meet a 7% annual growth rate and had no alternative but to cancel or defer these facilities.

We are, however, rapidly approaching the end of that era. The North American Electric Reliability Council has recently concluded that the present and planned electric power capacity will accomodate a rate of growth of 2.2% for the next 10 years. This assumes timely completion of all of the plants currently under construction, both nuclear and fossil, as well as completion of those coal-fired power plants whach are "planned" but which have not yet been ordered. It should also be noted that this is a national average and some areas can accommodate even less growth.

The growth rate during the past two years has been substantially higher than 2.2% p.a. While it is impossible to forecast the rate of growth of electric power demand precisely, it would seem prudent for utilities to plan on a rate of growth at least equal to that of the Gross National Product which is expected to grow by at least 3% over the next decade -- some predict an even higher rate, of 4% or possibly higher.

In order to assure completion of new capacity in the early 1990s when it is likely to be needed in some areas (and assuming an orderly licensing and construction process), many utilities should be ordering new coal or nuclear capacity within the next year or two.

Thus, the question of what type of plant to order will likely arise in the relatively near future. We belive the utilities will not only want to continue to diversify their supply sources between coal and nuclear, if possible, but will also find that nuclear power is economically competitive in many areas -- providing the plants can be licensed and built in a predictable and orderly manner.

We are concerned that if nuclear power is not a "starter" in the race for new orders then it will be much more difficult for it to be considered later not only because of the psychology but also because the capabilities of the supply industries will continue to deteriorate with little or no business.

It should also be noted that many other countries such as Japan, France, Taiwan and Korea which have successful nuclear power programs, are also concerned about the resumptions of nuclear orders in the United States and the maintenance of a strong U.S. industry since they feel their own programs will be adversely affected if this is not achieved. The U.S. nuclear power program is of importance to them since the U.S. Has been the leader in the development and demonstration of the successful use of nuclear power.

While there are many other considerations for the utilities thinking of new plants including new nuclear plants a critical item for nuclear plants will be the licensing process, particularly the uncertainties of it, as well as the time required, the complexities, and the continuing financial risks.

There is thus, a need to greatly improve the nuclear licensing process and this is urgent in terms of prospects for new plants. Legislative as well as administrative actions appear to be necessary to help remove the uncertainty in the minds of utility executives and investors concerning future commitments to new nuclear orders.

At this point, I would like to discuss the broad issue of "standardization", now a much maligned word. It is our perception that there is no single definition of the term standard design. There is even less agreement as to what should be accomplished by a standard design. We suggest that the starting point is a standard set of criteria and requirements, both technical and regulatory. Until these exist, the term standard plant has no basis. We believe the major objectives of standardization is to reduce the proliferation of new designs, new training programs, new operating procedures and new regulatory reviews. This objective is accomplished by duplicating or replicating of plants that already have designs, training programs, procedures, regulatory reviews and successful operating experience. Therefore, it is important to consider standardization in the context of what probably is a realistic scenario for the revitalization of nuclear power plant orders.

This can most easily be visualized by considering the situation of an electric utility when they finally conclude that they must consider the nuclear option. The only course which would appear to be prudent to minimize risks would be to order a nuclear unit which is essentially a duplicate (with minimum modifications) of a unit which has been licensed and constructed in an orderly way with few difficulties and which is operating reliably and efficiently. Such an order would likely include the same major suppliers as those responsible for the "reference plant." Such a unit should be a "modern" design which has received an adequate level of review by the NRC.

It appears most unlikely that these new "pioneers" in the nuclear business will be at all adventurous in terms of buying "improved" but untested designs or new types of reactors which have not been licensed, designed, and operated.

The "reformed" licensing process must be based on accepting this approach or there are not likely to be any new orders for nuclear plants.

This is not to say that modified and improved designs may not be utilized later on and that advanced reactors will not find a place eventually (HTGR, FBR, etc.) but risks involved in the new "first off" ventures and the very large costs associated with new designs (which no one is prepared to pay at present without a "going industry") makes them unlikely candiates for the initial round of new orders. Without the first new orders there will not be "later" ones.

The reformed licensing process should, of course, be prepared to accommodate these other approaches at the appropriate time without having to do the process over again. Thus these approaches really should be considered in parallel even though they are not likely to be utilized for some times except perhaps in unusual cases.

If the scenario advanced above is valid then those asking for licenses for new plants will have an essentially complete design as well as operating experience on the units at the time they are requesting a license. This should expedite the licensing process, furnish a basis for a combined construction and operating license, and provide a basis for using currently operating units as a "standardized" design. The risks of licensing, schedules, costs, performance, and quality would be greatly reduced.

This leads to the concept of "standardized plants" evolving from the reference designs selected by those who wish to build new nuclear power plants. This seems like a rational, low risk, and relatively inexpensive way of achieving the goal of practical standardization.

Another important aspect which should not be foreclosed by the new licensing procedures is the re-start and completion of some of the units which have been deferred but maintained in condition so that construction can be resumed. While these are not "new units" in the sense described above they may well represent the most economical way of getting additional capacity in many instances. It is presumed that the construction would proceed with any needed modifications and that an operating license would be applied for and processed. It is important that the procedures for this be clearly established and carried out in a businesslike way. It should be possible for the NRC to do this by adequate planning and administrative action.

Another case which may arise is where a utility might wish to add another unit of essentially the same design as an existing unit they are currently operating in order to consolidate and simplify operations. When the exisiting unit is operating satisfactorily consideration should be given to allowing this limited use of a reference plant as a basis for duplication even though it might not be suitable for general use by other utilities. Duplication by the owning utility is not design proliferation and introduces no new problems of training, operation or regulation.

We cite these other avenues simply to point out that the situation will remain complex and will need to include parallel procedures and considerations for the several possibilities.

A basic question is "what is a 'standardized design'"? In the operative sense for these discussions it is presumed to be a design which can be utilized by a utility on an approved (or pre-approved) site with a minimum of review for a combined construction and operating license. The review would be limited to variations from the basic design because of site consideration although it seems inevitable that some new questions might be raised by the NRC. However, a basic "standardized design" should be valid for some period of time, 10 years from receipt of design license has been suggested, with the burden of proof on those who might seek changes.

However, this operative definition does not answer the basic question. While I will not presume to try to define the "adequate level of review" by the NRC some of the other issues can be addressed.

It is often overlooked that most of the components and materials that go into a nuclear plant along with the procedures for testing them as well as the construction are covered by standards developed by the various professional standards organizations (ANSI, ASTM, the professional engineering societies, etc.) This is a massive and thorough effort as I can attest as a former director of ASTM. In addition, the designs, manufacturing processes, and quality procedures are highly standardized by the component suppliers including entire systems -- even the Nuclear Steam Supply System (NSSS).

It is in the selection and assembly of these into a complete plant that many of the difficulties arise which seem to cause confusion about the term "standardization." This process has, in fact, led to a large number of different designs. There are a considerable number of features of an overall plant which are dictated by the characteristics of the site itself and the location of the plant on the site. There are many other variations which have resulted from selection of different assemblages of components and equipment in one unit as compared with another, from preferences by the owner many of which result from his operating practices, and differences which arise because engineers sometimes just like to design things differently or "improve" on old designs. In addition, a large number of changes have been caused by instability in the regulatory process itself. The combination of these factors led to a difficult situation which does need to be avoided to the extent possible in the future.

Bechtel has pursued and practiced standardization by using an approach involving modules and standard design methods which can be separately approved and then combined in different arrangements to achieve a complete plant design. What are called "topical reports" have been prepared on these and submitted to the NRC for review and approval. Bechtel has termed this the "generic approach". We believe this is a practical approach since the various modules and systems can be selected depending upon the basic NSSS supplier chosen by the utility, the turbine-generator supplier chosen by the utility, and the specific requirements of the site itself. Where permitted, this approach has been reasonably successful and has been applied to five units constructed in the U.S. and six units overseas. In addition, it was the basis for a number of other units that were deferred or cancelled.

In 1973, a group of five utilities proposed to build five identical units on four specific sites. This group sponsored the Standardized Nuclear Power Plant System (SNUPPS) utilizing Bechtel's generic plant and the Westinghouse RESAR 35 NSSS. This was the first and only multi-owner and multi-site nuclear power project using a single design. It utilized the NRC's duplication option for standardization. This approach raised some questions on restraint of trade and the utilities requested a review by the Anti-Trust Division of the Justice Department. This review resulted in a qualified approval of the arrangement. Because of a lack of load growth only two units were completed, Callaway in Missouri and Wolf Creek in Kansas, but in our opinion this was a successful project and is a proven approach to standardization for the U.S. market.

There are two very fundamental limitations on any "standardized plant" concept. One of these is the necessity for competition in supply (which if limited will be of concern to the utilities involved, their regulators -- and to the Antitrust Division of the U.S. Department of Justice.) Modules and systems which can be interchanged depending on the supplier and many of which can accommodate different suppliers of individual pieces of equipment (pumps, valves, heat exchangers, etc.) alleviate this problem but may not completely eliminate it. It is pertinent to observe that in France where even the "standardized plants" vary significantly there is only one supplier and only one utility.

The second basic issue is that of the site requirements. As compared with many countries of small size and reasonably uniform characteristics, such as France, the site characteristics and requirements in the 50 United States vary significantly and preclude "down to the last detail" standard plant designs.

These requirements have an impact on the overall plant design but do not substantially affect the various nuclear modules and systems which can be designed to accommodate the changes in them which occur because of site requirements.

Some of the site specific factors which always need to be considered include the following:

Site geology -- foundation requirements and design
Seismic design criteria
Flood protection design -- rivers and oceans
Fresh vs. salt water conditions (and protection)
Closed cycle vs. once through cooling
Cooling water temperatures and local meteorology
Water purification systems -- cooling and process water
Orientation of water intake and discharge structures
Orientation of power lines and switch yards
Orientation of transport facilities -- railroads, docks, roads
Electrical requirements of system being served -- transformers and switchyard
Extreme (design) weather conditions

These factors, along with other similar ones, do not preclude standardization in the reactor or other components of the overall plant but do emphasize the need for flexibility in the definition of "standardization" and implementation of a program for using standardized plants. The criteria for these features can be standardized, but the specific designs cannot.

While many sites will share common characteristics in one or more of the categories outlined above, it is unlikely that more than one site will have the same set of characteristics. They may not even be exactly the same for "twin" units on the same site.

It is fortunate that these types of site specific requirements are not in themselves generally critical to reactor safety. Those which are, such as seismic requirments, can be standardized for specific groups of sites.

It seems apparent that "standardized designs" cannot be defined in legislation except in the operative sense. Policies, procedures, criteria, specific findings, etc., can be established by law and the certainty and simplifications desired in the licensing process can be improved greatly by such changes and the concept of "standardized plants."

However, and this is a very key point, the interpretations with respect to standardization will be a matter of judgement. These judgements should be carried out in an orderly and timely process by knowledgeable and experience people backed up by sound technical advice.

In conclusion, it is important to recognize that there are a variety of approaches to nuclear power plant standardization which must be considered in any legislation on this subject. Nuclear power plant standardization legislation should recognize the practical aspects which allow;

1. Utilities to restart the construction of nuclear power plants which are currently deferred,
2. The ability of a utility to replicate the design of an existing nuclear plant on their own system even though it may not be a design suitable for a broader application.
3. That replication or duplication of a successfully operating current vintage nuclear plant such as SNUPPS and Palo Verde is the most likely scenerio for the next nuclear power plant ordered in this country.
4. The eventual licensing of modified and improved design as well as "advanced" reactors such as the HTGR, FBR, etc.

STATEMENT OF
JAMES T. RAMEY, VICE PRESIDENT
STONE & WEBSTER ENGINEERING CORPORATION

Stone & Webster

Subcommittee on Nuclear Regulations
Committee on Environment and Public Works
United States Senate
July 11, 1985

STATEMENT OF
JAMES T. RAMEY, VICE PRESIDENT
STONE & WEBSTER ENGINEERING CORPORATION

SUBCOMMITTEE ON NUCLEAR REGULATIONS
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
JULY 11, 1985

Mr. Chairman and Members of the Subcommittee:

My name is James T. Ramey. I am Vice President and Senior Energy Advisor to the Chairman of the Board of Directors of Stone & Webster Engineering Corporation. I have previously testified before the Congress on these issues before us today beginning in 1971, with the last time being before the House Subcommittee on Energy and the Environment, Committee on Interior and Insular Affairs in June, 1983. I also have had the privilege of having served as a Commissioner of the Atomic Energy Commission for about eleven years where I was the "lead" Commissioner for licensing and regulation issues.

I appreciate your invitation of June 20 to appear today to express our views, as an engineer-constructor of nuclear power plants, on the need for legislation which encourages standardization as well as to provide comments on the merits of the NRC and DOE legislative proposals. At the present time, there is pending before this committee, S. 836, the "Nuclear Power Plant Licensing and Standardization Act of 1985". As your letter indicates, the Department of Energy has transmitted proposed standardization legislation to the Congress, and Congressman Broyhill and a number of co-sponsors have introduced H.R. 1029 in the House.

We are firmly convinced standardization and related measures will assure adequate safety while creating an environment of predictability and reasonable certainty as to the licensing process. Such improvement is essential to a climate in which utilities will once again consider ordering nuclear power plants. Because about half the cost of a plant is a function of the time involved -- as reflected in interest and inflation -- it is imperative to bring greater stability to the overall process.

The current statutory licensing procedures were developed when the nuclear industry was getting started. This process has proven to be cumbersome, lacking in stability, and unnecessarily costly to the consumer, the regulators, and the industry. In this regard, the present licensing process diverts scarce regulatory and industry resources from uses that would better serve safety aims. Thus, standardization is greatly needed to combat inefficiencies in the current regulatory regime.

It has been proposed, and it is certainly arguable as a legal matter, that many of the concepts of standardization could be achieved through administrative action. It is our position that the policy and program on standardization must be established by legislation and implemented by administrative action if it is to be effective.

The key to certainty and stability in the nuclear licensing process is discipline in all phases of the process and on the part of all participants. Legislation is necessary to provide this discipline and to provide for the long-term policies which would transcend individual philosophies within NRC and the nuclear industry. Administrative reforms alone, involving the exercise of discretion by NRC, have proved to be insufficient. It is important that Congress clarify its position and take a leadership role to provide the legislation required to stabilize nuclear regulation and licensing. In simplistic terms, Congress must express its intent and provide the legislative impetus to make it happen.

Stone & Webster Engineering Corporation is a pioneer in nuclear plant standardization. We began our efforts on standardization in the late 1960s and have participated in the NRC standardization program since its inception in 1972. We were the first engineer-constructor to receive approval from the NRC for a "reference" balance-of-plant design, in May, 1976, matching a specific nuclear steam supply system. This was, of course, a Preliminary Design Approval.

Attaining our first Preliminary Design Approval was the result of a commitment of hundreds of our engineering and design personnel over a decade to a project dedicated solely to this reference design. This effort included not only development of engineering, but also construction planning to ensure that the design was as efficient to construct as possible.

Since receipt of the Preliminary Design Approval in May, 1976, we have had our balance of plant design approved relative to two additional reference nuclear steam supply system designs and had requested an approval for a fourth. These approvals required additional engineering of our reference design to provide the proper match with the particular nuclear steam supply system. Even with this additional engineering, the vast majority of the balance of plant was maintained as a single standard design. Our reference design was used in the first application, submitted by New York State Electric & Gas Corporation and Long Island Lighting Company, for a construction permit which incorporated both previously approved nuclear steam supply system and balance of plant reference designs. The application was, unfortunately, withdrawn by the utility due to reduced power demand.

We also have been active in other types of standardization programs such as the NRC Topical Report Program. We have received NRC approval for topical reports on subsystems for the reference nuclear power plant, on an independent spent fuel storage facility, and on various software. In addition, we were the first engineer-constructor to receive, in 1974, NRC approval for a standard nuclear quality assurance program. We also have standardized our construction methods and procedures, such as material controls, handling and storage, steel erection, and concrete placement.

We believe standardization can contribute positively in a number of ways. Repeated design, construction, and manufacturing techniques and procedures permit increased efficiency, resulting in higher quality, and that translates to greater safety. Another significant advantage of standardization is the reduction in the number of plant design variations with which plant operators and operational support teams would have to be familiar. This would ensure increased operator capability. Standardization will permit greater concentration of specialized talents on more detailed safety considerations and front-end engineering which is often preferable to in-process development as it occurs without the pressure of a plant completion schedule. Because of favorable cost impact, the additional benefit of lower power costs to the public is also achieved by standardization.

An appropriate base for standardization to build upon is available in today's plants. The level of safety of these plants is high. The extreme level of conservatism present is evidenced in the available documentation that shows the amount of radioactivity assumed to be released from the plant in a postulated accident - the nuclear source term - used in the design of these plants is considerably overstated.

The keys to realizing the above benefits and, from our perspective as an engineer-constructor, perhaps the most significant aspects of any new legislation are two-fold: A provision for approval of designs for major portions of a plant prior to the application for a license to build and operate a specific plant, with its encouragement of standardization; and a single-stage licensing process. These provisions ensure early and knowledgeable public participation in the licensing process for a particular plant and for a pre-approved design. This is the appropriate time for effective public participation, because all the information necessary to make final determinations on plant safety is available. It is also a time before significant resources have been expended on plant construction.

We endorse provision of early design approval, independent of site or license application. Under such an approach, the developer of a design for a nuclear plant or major portion of a plant would submit a Safety Analysis Report with an application for a Design Approval. The applicant could be either a reactor manufacturer, an engineer-constructor, a utility, or any combination of these. The application could describe a nuclear steam supply system or a balance of plant, as was the practice under the reference system option of existing NRC standardization policy. An entire plant could also be described as was done under the manufacturing license, duplication, and replication options of this NRC standardization policy.

We endorse the use of a balance of plant matched with a nuclear steam supply system, because it is consistent with the well-tested and long-standing practices in the nuclear industry. Also, the use of this approach will ensure that the significant amount of expertise now within existing engineer-constructors and reactor manufacturers would not be lost and there would be no loss of continuity in maintaining safe operation of plant designs already in use.

The many benefits of standardization can best be realized through use by all of the qualified participants in the nuclear business. Legislation, therefore, should direct rather than merely authorize the NRC to establish procedures for approval of both facility and major subsystem designs. This will ensure establishment of procedures to provide maximum flexibility and use of pre-approved designs. We believe that a true single-stage licensing process is both feasible and realistic. A single hearing in conjunction with the issuance of a combined construction and operating license can properly treat all the issues not covered by any pre-approved designs and sites being used in the application. Implementation of the design and the software (e.g., quality assurance programs and emergency plans) is audited during construction and tests or practice exercises. A single stage licensing process would not result in a reduction in safety or meanful public participation because the NRC currently has authority to order a hearing at any time it deems necessary to protect public health and safety and to prevent operation of any facility not in compliance with provisions of a license.

An important aspect of the single-stage licensing process is determining the extent and level of design information necessary for the NRC to determine that a plant is designed, and can be constructed and operated, in conformity with the provisions of the Atomic Energy Act and the NRC's rules and regulations. We believe an in-between level of design information, i.e., a considerably greater level of design detail in many areas than a current Preliminary Safety Analysis Report but less than a current Final Safety Analysis Report, would be sufficient and reasonable for the NRC to reach a conclusive safety determination. The detailed design documents i.e. calculations such as cable tray loads etc. and drawings such as pipe supports are used primarily in the construction phase rather than the initial phase. They also must be checked after procurement of hardware. This design level requires criteria and standard specification and design methods which are verifiable by the NRC, as necessary, during procurement and implementation of the design.

We further endorse the concept of an Early Site Approval process. We suggest that legislation state clearly that an applicant may describe, in total or in part, an acceptable environmental impact for a particular site , based on an envelope of parameters, without the necessity of specifying the plant size. This would provide the applicant with the flexibility of constructing one or more facilities on a particular site so long as the cumulative environmental impacts associated with those facilities remain within the previously approved acceptable site related impacts envelope.

Nuclear plant standardization must carry with it the discipline of regulatory stability. The NRC staff has ignored the current backfit rule by not showing that imposed backfits meet the criteria stated in the rule. Administrative actions that change regulations, practice, and policy one month can change them back again in the succeeding months. There is a pronounced need for legislative requirements which are not subject to change administratively and that provide the stability necessary for nuclear power to serve the public needs safely.

It is in the public interest to weigh the enhancement in the overall level of health and safety to the public against the cost to the public. This balancing will greatly stabilize design and site approvals and enhance standardization. It will also stabilize the entire industry, from plants under construction to plants in operation. Proper backfit requirements are basic to the continued viability of the nuclear industry and should be applied throughout all phases of design, construction, operation, and regulation.

I understand that you have before you the recent report from the Congressional Research Service which compares the principal legislative proposals with each other and their progression from those before the last Congress. I have no intention of reiterating the observations in that report, but I do note that we concur in the distinctions observed. May it suffice for me to observe that the legislation submitted by the NRC, S. 836, pending before this committee, goes a long way toward achieving the objectives I have described. The Department of Energy recommended approach goes further and, we believe, is more comprehensive.

I believe that the standardization process would be substantially enhanced by enactment of any one of the proposals with maximum benefit coming from a combination of the best features of each. For instance, we endorse the "conclusiveness" of design approvals provided by the DOE version as it would prevent repetitive litigation. Additionally, the criteria to be applied in approving changes to such design approvals are more appropriate in the DOE bill in that they are more consistent with the principles of standardization. Similar provisions are accorded the approval of a site by the DOE bill only.

With respect to the combined construction and operating license, the DOE and NRC are in substantial accord. One positive aspect of the DOE version not presented by the NRC is the phased approval of construction quality assurance which we would recommend. This approval should be part of the NRC's inspection activities and should not involve additional submittals. This phased approval, coupled with the availability of results of the inspections, tests and analyses specified in the license, will provide assurance of conformance of the plant to the license. This reinforces our previous statement that a legislated second hearing opportunity is unnecessary for a combined construction and operating license.

Perhaps the area of most distinction between the bills is the so-called "backfit" provisions. We endorse the approach recommended by the DOE as the one providing the greatest guidance and certainty of result. We also particularly agree with inclusion of a balancing of costs and benefits in this evaluation.

In summary, we believe the existing process for licensing and regulation of nuclear power plants is neither predictable nor stable. Any proposed legislation should provide for standardization available for use by qualified organizations for major portions of a plant and should seek to improve the opportunity for early public participation in the process while minimizing the potential for abuse of the process by those bent only on delay. If these improvements are adopted, it is our view that the quality of NRC decisions in the resolution of health, safety, and environmental issues is likely to be further enhanced by passage of such legislation.

In conclusion, I would point out that the first comprehensive licensing reform legislation was proposed by the Atomic Energy Commission in 1971. The Calvert Cliffs decision seemed to get in the way of serious consideration of that legislation in 1971 and 1972. In 1973 and 1974, the Price-Anderson Act extension took priority over licensing reform. And in 1978, the Carter Administration did not seem able to generate much enthusiasm for reform. In the past few years, the nuclear high level waste legislation received priority. I would hope that consideration of Price-Anderson extension, important as it is, will not preempt consideration of standardization and licensing improvement again this year as well.

The electrical energy needs of our country are critical. Nuclear power can play an important role in meeting these needs safely, economically and on an environmentally sound basis. We are convinced that efforts to stabilize and bring predictability to the licensing process will advance the realization of that goal. We support the need for legislation and urge the Congress to act on these legislative proposals before you.

This concludes my remarks Mr. Chairman. I would be happy to respond to your questions.

STATEMENT OF
JAMES W. VAUGHAN, JR.
ACTING ASSISTANT SECRETARY FOR NUCLEAR ENERGY
BEFORE THE
SUBCOMMITTEE ON NUCLEAR REGULATION
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
U.S. SENATE

JULY 11, 1985

Mr. Chairman, it is a pleasure to be here today to discuss the critical need for reform of our nuclear licensing and regulatory process.

S. 836, a bill transmitted to the Congress by the Nuclear Regulatory Commission (NRC), and S. 16, a proposal to establish a National Academy for Nuclear Power Safety, are currently being considered by this Subcommittee. The Administration's legislative proposal to reform the nuclear licensing and regulatory process, entitled "The Nuclear Facility Standardization Act of 1985," was forwarded to the Senate on May 7 and introduced in the House as H.R. 2488. In our view, the Administration's proposal encompasses the key features of the NRC bill, as well as those of a bill previously introduced by Representative Broyhill in the House.

The Department regards enactment of licensing reform legislation during this session of Congress to be a matter of very high priority. It has broad and strong Administration support as a key part of our efforts to assure the continued viability of the nuclear power option.

I would like to focus my discussion on the basic principles and provisions in the Administration's legislative proposal, because they represent what is needed in legislation to revise the nuclear licensing and regulatory process. I will also comment on the education and training of nuclear powerplant personnel. Before doing that, however, I would like to discuss the importance of this subject in the context of our Nation's energy future.

THE NEED FOR NUCLEAR POWER IN OUR ENERGY FUTURE

The nuclear regulatory process that we seek is a key factor in supporting the Administration's energy policy of energy stability, security, and strength. Our Nation's continued economic growth, world-wide competitiveness, and security are dependent on the certain availability of sufficient energy supplies. Nuclear power is a key energy supply source, and as such is critical to maintaining a balanced and mixed energy resource base. Nuclear power contributes an important dimension to national security and our efforts to be free from dependence on foreign energy sources.

Today, nuclear power supplies about 15 percent of the Nation's electricity and this contribution will increase to about 20% by 1990 as plants nearing completion are placed into operation. After these plants are completed, however, we are faced with the serious situation of having no additional nuclear generating capacity being planned.

Coal and nuclear power are two indigenous resources for additional electrical generation. Even under conservative projections of the growth rate in electrical demand, our Nation faces a potential shortage of many gigawatts of new capacity by the year 2000. In addition, by that time about 115 gigawatts of our existing capacity (other than hydroelectric) will be over 40 years old. Many of these plants will experience declining performance or faceretirement just when the need for new sources of electricity is highest. Coal and nuclear power, along with the results of conservation, will be the most likely sources for additional new generating capacity. Today's realities, however, paint the bleak picture that the nuclear option for meeting our future energy needs is being rapidly foreclosed.

We cannot afford to imperil our energy security and rely on only one source of generation for our future electrical power needs. The nuclear power option needs to be available for America's future.

We have the technology to build and operate safe, reliable, and economically-sound nuclear powerplants. Our past experience demonstrates this. Foreign experience demonstrates this. Since 1978--the last time an American utility ordered a nuclear plant--more than 100 nuclear powerplants have been ordered by countries such as France, Japan, Germany, and the USSR. Our nuclear design industry has been continuing to improve its advanced reactor designs to apply state-of-the art technology and to further enhance safety by including features with more tolerance to operator errors. Some of these advanced designs are almost ready to be licensed and constructed overseas. So the question is not primarily technological, but institutional.

There are numerous, interrelated reasons for the current hiatus in new utility commitments to nuclear power:

- the instability and uncertainty in licensing and regulatory system;
- construction delays;
- poor construction management;
- inaccurate demand projections;
- inconsistent actions by state Public Utility Commissions and resultant rate shock;
- poor ratings by the financial community and capital formation difficulties for utilities; and,
- poor public acceptance and knowledge of nuclear energy.

We cannot solve all of these problems at once. Government must do its share, industry its share, and the State regulatory bodies their share. However, it is clear that the complex and unpredictable licensing and regulatory process is a prime contributor to construction delays, increased costs, and decreased public acceptance of nuclear power. Our efforts to reform the current licensing and regulatory process should be directed at remedying this situation. For those areas where the Federal Government has become part of the problem, we must be part of the solution. And we must do it now, so that nuclear power will be a viable option for new generating capacity with reasonable and predictable lead times, as a choice in the marketplace. Our action can provide the leadership for resolution of the other problems. Without this action, it is unlikely that utilities will again consider ordering a new nuclear powerplant.

GOALS OF LICENSING AND REGULATORY REFORM

The goals of licensing and regulatory reform should be: (1) to continue to assure public health and safety; (2) to continue to assure the effectiveness of public participation; and (3) to restore stability and predictability to the process of licensing, regulating, constructing and operating nuclear powerplants. Legislation should remove federally created disincentives and unnecessary roadblocks to the development and deployment of nuclear power. This action would allow utilities again to consider the option of nuclear power on its clear economic and environmental merits.

To realize these goals, legislation should include the following key features, all of which are embodied in the Department's legislative proposal:

- early approval of standardized, fixed plant designs;
- early approval of plant sites;
- issuance of a combined construction and operating license; and,
- a more effective process and criteria for implementing design modifications.

With these features, utilities could once again be in a position to commit to construction of new nuclear facilities with reasonable risk and shortened predictable construction schedules. A plant built in accordance with approved plans and specifications could therefore commence operation without delay.

I would like to expand briefly on the main goals of safety, public participation, and stability and predictability, and then comment in more detail on the specific key features of the Department's proposed legislation.

Safety

The ability of the NRC to approve standardized designs prior to and apart from a utility license application will be a major step toward improving powerplant safety. Designers, constructors, operators, and regulators will be able to concentrate their attention on a smaller number of standard reactor plant designs instead of on the numerous designs that characterize the present generation of plants. Legislation should also enable firm decisions to be made about major design considerations at the beginning of the process, rather than during construction. Changes to a plant design during construction can sometimes lead to reworking portions of the plant already constructed. Not only is time wasted--resulting in increased costs--but there can be a psychological impact on personnel that does not create a climate conducive to the high quality construction that nuclear plants require. Thus, the ability to make early, firm decisions should not only enhance plant safety performance, but also improve the economics of nuclear power as well.

A second step toward improving plant safety involves the avoidance of frequent, sequential modification to designs and plants, the so-called "backfitting" problem. The current regulatory procedure for making modifications has lacked a disciplined focus to achieve demonstrable improvements in safety. Further, the current process does not require consideration of the impact of an isolated modification in one system on the performance of other systems or on the plant's overall safety performance. We need to revise the procedures for modifying plants to help correct these problems--and thereby enhance safety--by establishing a more orderly, focused, and controlled process for determining needed modifications to nuclear plants.

Some of the proposed legislative changes to the "backfitting" process are already being implemented administratively by the NRC. To assure long-term policy stability and predictability, however, specific backfit provisions should have a statutory basis.

Effectiveness of Public Participation

A second goal is to continue to assure the effectiveness of public participation in the licensing process. The public may now take part in construction permit proceedings and, if they request, in operating license hearings. But, as the Kemeny Commission pointed out, under the current hearing process, many substantive issues cannot be fully considered until the operating license stage, at which point changes are not easily made. After a plant is essentially complete, with many hundreds of millions--or billions--of dollars already spent, the view of the public cannot, as a practical matter, be considered as effectively as it could be at the beginning of the licensing process. Therefore, the system should include multiple opportunities for public participation early in the process, before firm decisions are made by the NRC and the applicant. Standardized or fixed designs are absolutely necessary for this to be effective.

These opportunities would occur when the standardized plant designs are considered for approval, when a specific site is considered for approval, and when a combined construction permit and operating license is being considered. If truly new safety issues arise that have not been properly considered and resolved, there should remain a provision for these to be heard prior to the start of operation. Early participation will make public influence and expertise more effective in matters related to public health and safety. It will also make for the most cost-effective use of resources by intervenors, regulators, and industry.

A Stable and Predictable Licensing Process

A third goal of licensing reform legislation should be a stable and predictable licensing process consistent with the current needs of the industry, the regulators, and the public. Stability and predictability will be enhanced if sites and fixed designs are pre-approved, with public concerns raised and resolved before there is a decision to build such units, and if there is a more rational process for making changes. For both the industry and the financial community, the risk in proceeding with a plant would be significantly reduced. For the regulator, stability and predictability will allow allocation of its resources in a more coherent and efficient manner. For the public, stability and predictability will provide confidence for investment and reasonableness in electricity prices.

KEY FEATURES OF THE DOE LEGISLATIVE PROPOSAL

I would now like to specifically summarize those key features in the DOE legislative proposal; these features are essential to achieve the goals I have outlined.

Early Approval of Standardized Designs

The NRC would be authorized to approve standard designs for entire plants or major subsystems, so that utilities would have the option of choosing a basic plant of pre-approved design in lieu of a one-of-a-kind or customized plant design. Prior to approval, an opportunity for a public hearing would be offered. If approved, the design should remain valid for 10 years and be eligible for renewal.

Early Site Approval

The NRC would be authorized to approve sites for prospective nuclear plants in advance of a utility's decision to apply for a construction permit. The site permit would remain valid for 10 years, and be eligible for renewal.

Combined Construction and Operating License

Utilities would be permitted to apply to the NRC for a construction and operating license in one proceeding, as opposed to the current process whereby the construction permit and operating licenses are now obtained at different stages. Tests, inspections, acceptance criteria, and other matters necessary to provide construction quality assurance would be incorporated as part of the license. NRC inspectors would be permitted to approve major systems or tests as they are completed to avoid reopening old issues at the end of construction. An opportunity for a hearing would be provided prior to issuance of the license and on request by any person following completion of construction and prior to plant operation, but only under realistic criteria. There should be no provision that allows previously settled non-safety or recordkeeping issues to be brought up to merely intervene in the plant's operation. Utility, investor, and consumer interests must be upheld and not abrogated to intervenor actions which are without merit.

Design Modifications

The process by which the NRC has imposed modifications to designs during and after plant construction has lacked discipline. Numerous means for making changes have been employed; technical problems and their solutions are examined narrowly and without top management review, often without adequate consideration for how an isolated, specific modification may effect overall safety performance.

This situation could be corrected by requiring the NRC to conduct a centralized review of all staff backfitting proposals. Such a review would result in a more disciplined process for approving backfits--a process based on a quantitative assessment of the seriousness of the underlying safety concern, the value of the safety improvements that would result, and the cost of making the modification. In reaching a decision, the NRC must be assured that the modification will substantially improve the protection of public health and safety over the remaining operating life of the plant.

TRAINING OF NUCLEAR POWERPLANT PERSONNEL

In 1980, Congress requested that the Department of Energy evaluate the establishment of a Federal academy for training nuclear plant operators and inspection personnel. In its 1981 report to Congress, the Department noted that, subsequent to the Three Mile Island (TMI) accident, coordinated industry efforts, led by the Institute of Nuclear Power Operations (INPO), have focused on upgrading the training and qualifications of plant operators and supervisors. Since that time, industry training guides, accreditation boards, and criteria have been implemented by INPO as a major effort to assure excellence in nuclear powerplant operations. Progress in this area has been reviewed and the efforts endorsed by the NRC. The NRC has also upgraded its practices of periodic examination and certification of plant operators against standard criteria, and has increased its efforts to train Federal personnel involved in oversight of nuclear powerplant operations.

Notwithstanding these actions, the Department considers that more can and needs to be done to assure a fully adequate level of education and training for those involved in supervising and operating nuclear powerplants, in order to assure a level of professionalism commensurate with the degree of responsibility necessary to protect public health and safety.

In this regard, the Department endorses the following objectives:

(1) ensuring the availability of qualified and adequately trained personnel to operate civilian nuclear powerplants in a manner that protects human health and safety; and,

(2) ensuring that civilian nuclear powerplant personnel are trained consistent with the rules and regulatory guidance issued by the NRC.

The Department considers it appropriate for the Federal Government to work with private industry to further the organization, staffing, and operation of a national nuclear safety training academy. Primary responsibility for these efforts should rest with an appropriate industry organization, such as INPO, formed by the utilities operating the plants. It is these utilities who under NRC license accept the responsibility for safe and reliable operation of the plants. Assuring an adequate level of education and training for the supervisors and operators is an inherent part of this responsibility. Accordingly, the Department encourages the formulation by industry and Government of a more uniform and aggressive plan for assuring a high level of education and training for plant supervisors and operators.

CONCLUSION

Nuclear power is now an important part of our electric supply system. It can become a viable option for future electric supply for America if the disincentives which have caused it to become an unacceptable economic risk can be removed. For its part, the Federal Government needs to remove the disincentives it has created which have contributed to this situation. In 1983, the Department submitted to the Congress a licensing reform bill, as did the NRC. Hearings were held on the proposed legislation in the House, but no further action was taken. Now in 1985, NRC and DOE are again proposing nuclear licensing reform bills aimed at providing increased plant standardization and other needed features. In the House, Congressman Broyhill--along with more than 60 co-sponsors--has introduced similar legislation that addresses many of the same objectives as the DOE and NRC bills. The Department is encouraged by these actions and urges the Congress to find the legislative solutions to the nuclear licensing and regulatory dilemma facing us today.

Providing new electric generating capacity requires long lead times. We must act now to demonstrate Federal leadership. We must have a more stable and predictable licensing and regulatory system in place--one which incorporates the key features I have discussed--to permit utilities to practically consider ordering nuclear powerplants for new generating capacity that even conservative demand projections tell us will be needed to sustain our economic growth. History teaches us that effective leadership by the Congress and the Administration is needed now to proceed on a rational basis toward that goal.

By all involved working together, we can assure that safe and reliable nuclear energy continues to contribute to the Nation's economic growth and energy security at reasonable cost to American consumers.

This concludes my statement. I will be pleased to respond to your questions.

STATEMENT
OF
WALLACE B. BEHNKE
BEFORE
NUCLEAR REGULATION SUBCOMMITTEE
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
JULY 11, 1985

My name is Wallace B. Behnke. I am Vice Chairman of Commonwealth Edison Company. I am accompanied by Barton Z. Cowan, Chairman of the Atomic Industrial Forum's Lawyers Committee and a partner in the law firm of Eckert, Seamans, Cherin and Mellott. On behalf of the Edison Electric Institute, the Atomic Industrial Forum, and the American Nuclear Energy Council, we welcome this opportunity to appear before you today to discuss the subject of nuclear plant standardization and licensing reform.

With more than a quarter century of commercial operating experience, civilian nuclear power has proven its worth. It is a significant and growing component of electric power supply both here in the United States and throughout the world.

Over 340 nuclear generating units provided about 13 percent of the world's electricity produced last year. Twenty-six countries are producing nuclear-generated electricity and fifteen more plan to do so by the end of the century.

Of the 220 million kilowatts of nuclear generating capacity in commercial service world-wide, the U.S. is by far the largest producer with about one-third of the total. Last year, 82 U.S. nuclear plants produced nearly 13.6 percent of our nation's electric generation. This is expected to grow to nearly 20 percent by the end of the decade when the 33 nuclear plants currently under construction and scheduled for completion go into operation.

In some areas of the country, nuclear power's contribution to the electric supply is much greater. At Commonwealth Edison, for example, nine large nuclear units are currently producing about 59 percent of our generation, and this will increase to over 70 percent by 1988 when the three remaining nuclear units in our current construction program are expected to be in full operation. At Commonwealth Edison, nuclear power is by far the lowest-cost method available for base load generation. Our $1.3 billion fuel cost last year would have been $890 million or 70 percent higher had we used low-sulfur coal instead of nuclear fuel.

Notwithstanding its growing importance to U.S. energy supplies, there are serious on-going problems in the nuclear industry. Many of these problems are related to nuclear regulation, despite the efforts of Congress and the Commission itself to bring about meaningful improvement in the regulatory process.

The economic cost resulting from these problems has been enormous, with nuclear plant reliability reduced and further deployment of the nuclear energy option virtually foreclosed. No responsible person argues against high standards and strict quality control -- along with the pursuit of excellence in design, construction, plant operations and management -- to ensure that high quality is maintained wherever the public health and safety is involved. But one has only to look at the success of civilian nuclear power overseas to sense that something is inherently wrong with nuclear regulation in the U.S.

Problems with respect to the Commission's technical determinations, including but not limited to ratcheting and backfitting, have been manifest for the better part of two decades. Various ACRS and ASLB actions and procedures often make the situation worse. More recently, the Commission's own procedural deficiencies have come to the forefront and are adversely affecting the construction and licensing of nuclear power plants. Under the "collegial" approach to decision making imposed by the statute, the Commissioners have been unable to bring about effective control of the regulatory process. Its adversarial and sometimes arbitrarily punitive approach to nuclear regulation makes it extremely difficult for a utility to supervise and direct its work force in a manner that maintains high standards of safe and efficient plant construction and operation. There is, for example, the recent internal report of a regulatory culture having emerged within NRC which sees nothing wrong with disregarding the statute, NRC regulations as well as the Commission's own direction, and even intimidating licensees to gain concessions which have little legal or technical basis. The licensing process is especially vulnerable to manipulation by self-serving special interests. Also, the courts are continuing to become an even more important factor in NRC regulatory decision making. As Secretary of Energy Herrington noted recently, nuclear regulation has probably done more to undermine public confidence in nuclear power than its adversaries.

Adding to the problem has been the significant shift in primary focus of the NRC licensing and regulatory process since the early 1970s when most of the important regulatory decisions were made in the context of construction permit proceedings. With the large number of plants now being completed, the rapid increase in operating license proceedings brought on many new problems, including those caused by the procedural inadequacies of the NRC licensing and regulatory process. Following the TMI occurrence, with the benefit of hindsight, it is now clearly evident that the regulatory process failed to respond effectively to the exigencies of the licensing situation. This was apparent in such proceedings as Shoreham, Zimmer, Diablo Canyon, TMI-1 restart, Byron, and numerous other cases where the judicial process and procedures, rather than technical considerations, either caused problems or made them worse. Now in the mid-1980s we are facing yet another transition as the operating license cases are completed and the primary focus of NRC regulation is shifting to the operating plants. There is no reason to believe that a process originally designed to handle licensing proceedings, and which has operated poorly in many of those cases, will be any more responsive to the circumstances of operating plants.

The nuclear industry believes that a high priority should be assigned to corrective action to ensure that the NRC regulatory process does not impede the on-going safe, reliable and cost-efficient operations of the nuclear power plants in which several hundred billions of dollars have been invested. There is also an immediate and urgent need to minimize the economic waste resulting from delays in licensing and starting up the plants under construction. Of long run importance, is lifting of the barriers to the licensing of future plants needed in the 1990s and beyond. Lifting these barriers will be a difficult long-run task. It will involve both overhaul of the process itself and restoration of confidence in the stability of nuclear regulation on the part of utility decision makers, public utility commissions and the financial community.

Overall, NRC management and staff accountability on policy and implementation should be improved, particularly with regard to managing the control of requirements and the close-out of unresolved technical issues. Specifically, there is an urgent need for a workable backfit rule along with an NRC management commitment to implement it. This should be a top priority. Additionally, in the immediate future we believe it is important that the NRC finalize a policy on safety goals which reflects cost-benefit considerations, and update its regulatory policies with respect to severe accidents and emergency planning to reflect more realistic source term assumptions. We also feel it is important that the NRC simplify technical specifications which attach to NRC licenses. The technical specifications for the most recently licensed plants have become incredibly complicated. We are encouraged that the Commission is giving weight to the industry's initiatives through INPO and NUMARC with respect to the pursuit of excellence in plant operations by deferring consideration of staff recommendations for more prescriptive regulation in this area. For the longer run, we support the concept of expedited licensing for plants which utilize standard designs that have been pre-licensed by the NRC.

Turning next to the matter of urgency, no one knowledgeable about the subject doubts that economic growth will eventually require more central station electric generating capacity and that worn-out and environmentally obsolete facilities will have to be replaced. Moreover, if there's one lesson we have learned in the past 15 years, it is that there continues to be a strong correlation between the behavior of the economy and the use of electrical energy. While total U.S. industrial energy use has actually declined slightly since the 1973 oil embargo, essentially because of the reduction in petroleum consumption, the use of electricity has grown 30 percent while the overall economy has expanded 31 percent. Quantitative forecasts of economic growth and electric energy consumption vary widely, but nearly everyone agrees with the concept that economic growth and prosperity is a national objective of the highest priority. The logical extension of that principle, given the recent history of the correlation between economic growth and electric energy usage, is that electrical output will continue to climb at a rate equal to or greater than the growth in gross national product.

There should be enough electric generating capacity to support moderate economic growth into the early 1990s, barring another major oil cut-off and provided the generating plants presently under construction are completed as scheduled. But generating reserves are not evenly distributed and some regions are likely to run short of power even sooner. Moreover, accelerated economic growth, regulatory delays, and changes in environmental growth could quickly erode today's seemingly adequate generating reserve margins. While electric generating reserves currently exceed planning minima in most areas of the country, it's only a question of time until these margins give way to economic growth. Because the lead times for a large generating unit are now in the range of 8 to 14 years -- sometimes longer if we are dealing with a project that has run afoul of the regulatory process -- hard choices about the future will have to be made soon. With lead times of this magnitude, we should be making decisions now for 1995 and beyond.

Pending before the Subcommittee today is S. 836, the NRC's proposed, "Nuclear Power Plant Licensing and Standardization Act of 1985". This bill, along with the DOE proposal which has yet to be introduced in the Senate, looks largely toward the future. We are encouraged that both the NRC and DOE have recognized that without change in the regulatory system, nuclear power can no longer be regarded as a viable option for the increments of electric generating capacity beyond the units currently under construction and that the licensing process will have to be overhauled if we, as a nation, are to continue with a strategy of providing a balanced energy mix for the production of electric power.

While the focus of my remarks is primarily on the provisions of the NRC and DOE bills, let me underscore again our industry's concern that overhaul is urgently needed in the licensing and regulatory process relating to operating plants and those still under construction. In that regard, I would like to call your attention to H.R. 1029, the Broyhill bill pending in the House of Representatives which, unlike S. 836 and the DOE proposal, addresses the current problems, particularly backfitting. Our industry supported this legislation in the last Congress and continues to do so.

Mr. Cowan will present a more detailed statement of our views on S. 836 and the DOE proposal, but let me first comment on the principal features of this legislation.

Both NRC and DOE are in substantial agreement on the underlying rationale for standardization and the other objectives of this legislation. Both bills would provide authority to NRC to issue combined construction permits and operating licenses. The industry has long seen such authority as the cornerstone of a stable licensing system which would once again permit consideration of nuclear power a viable option for the future. Both bills also provide for NRC generic approval of standard designs and separate site certification. While we have some specific problems with the approach taken, the industry endorses the basic concepts as essential.

Pre-approval of standard designs would upgrade the licensing process in several respects. First, it would improve safety by enabling both the NRC as well as the reactor vendors and architect-engineers to concentrate their resources on fewer designs. Also, standardization should reduce the drain on these technical resources caused by design changes mandated by the NRC during the construction phase. This will simplify construction management and, concomitantly, increase the effectiveness of QA programs. Second, it should lower direct costs of new plants by allowing for design optimization and reduce construction rework and post construction design verification. Indirect costs, mainly the capitalized carrying charges known in utility accounting as allowance for funds used during construction, would be saved by shortening the construction period and avoiding needless delay. Finally, the cost of capital would be reduced by lowering the financial risk associated with the uncertainty attached to nuclear regulation. This would be an essential early step toward restoration of the confidence in nuclear power by public utility commissions and the financial community.

With standardization, safety reviews would no longer have to be conducted on the critical path, after a utility has made a substantial investment in the project. This would lessen the time required to license a plant and thus lessen the risk of future mismatches between loads and capacity on the nation's electric power systems. Use of the same standard design by several utilities would allow the common costs of designing and building plants to be spread over a larger base. Moreover, utilities could plan with greater certainty, knowing that a given design had already been approved by the NRC and would not be changed without good cause. Standardization would improve construction productivity and construction quality assurance. Better training of operating personnel would be possible. Improved standard designs would lead to improved plant maintenance and operating practices and make possible more effective and efficient inspection. Similarly, pre-approval of sites would facilitate better utility planning and reduce costs by enabling site reviews to occur off the critical path. Pre-approval would also facilitate public participation by allowing it to occur earlier in the process. This would permit decisions to be made without the time and economic pressure which accompanies the present process, and before large financial commitments are made. The consideration of environmental matters, as well as consideration of alternative means of generation, also would be enhanced by providing more appropriate decision making points for their evaluation earlier in the process than is now the case.

We urge your Subcommittee to move expeditiously to report a nuclear standardization and licensing bill. Taken together, the NRC and DOE bills provide a good starting point for drafting such a bill. The principal benefits of such legislation would be enhancement of public safety and reduction in the waste and inefficiency attending the current regulatory process. Standardized plant designs will benefit safety by concentrating the technical resources of the NRC as well as industry on a small number of designs.

Consumers would benefit from the reduced capital costs and lower financial risks associated with nuclear power plants and from the economies associated with improved on-line performance and reliability.

Thank you for this opportunity to appear before your Subcommittee. I will now call on Mr. Cowan to complete the statement of our views on nuclear licensing.

We will then be pleased to answer your questions.

STATEMENT

OF

BARTON Z. COWAN

BEFORE THE

NUCLEAR REGULATION SUBCOMMITTEE
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE

NUCLEAR REGULATORY COMMISSION
NUCLEAR POWER PLANT LICENSING AND STANDARDIZATION ACT OF 1985
(S. 836)

AND

DEPARTMENT OF ENERGY
NUCLEAR FACILITY STANDARDIZATION ACT OF 1985
(S.)

JULY 11, 1985

STATEMENT OF BARTON Z. COWAN
BEFORE THE NUCLEAR REGULATION SUBCOMMITTEE
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
July 11, 1985

My name is Barton Z. Cowan. I am a partner in the Pittsburgh, Pennsylvania law firm of Eckert, Seamans, Cherin & Mellott. I am appearing here today in my capacity as Chairman of the Lawyers Committee of the Atomic Industrial Forum, Inc. and Co-chairman of a joint committee of the Forum, the Edison Electric Institute and American Nuclear Energy Council formed early in 1982 to work on licensing reform.

The Lawyers Committee of the Atomic Industrial Forum, Inc. is comprised of approximately seventy-five lawyers involved in all aspects of nuclear energy law. Since early 1982 active operations of the committee have been conducted by a Steering Group comprising eighteen senior industry lawyers, who among them have over 300 years of experience with the nuclear regulatory process, including involvement in the licensing of almost every domestic nuclear plant during the past two decades. Included among the Steering Group membership are a number of lawyers who have held positions within the Nuclear Regulatory Commission, and its predecessor, the Atomic Energy Commission, including a former Chairman of the Commission, a former general counsel, and a former Director of Regulation. The members of our committee have seen both the best and worst in nuclear regulatory practice, and are well qualified to address the subject of nuclear regulation and reform by virtue of their long association with the nuclear regulatory process.

The purpose of my testimony today is to discuss the regulatory reform legislation proposed by the Nuclear Regulatory Commission (Nuclear Power Plant Licensing and Standardization Act of 1985 (S. 836)) and by the Department of Energy (Nuclear Facility Standardization Act of 1985 (not yet introduced in the Senate)) and to state our position with respect to the various proposals. During the course of this presentation, I will indicate where we agree or disagree with various legislative proposals and in some instances will suggest alternatives which we believe would result in a sounder regulatory process. Before turning to the main portion of my presentation, however, I would like to comment briefly on the need for reform of the nuclear licensing process.

Need for Legislation

When I testified before this subcommittee in June 1983 on the same subject of licensing reform which is the topic of today's hearing, I stressed the point that the nuclear licensing process is not working properly. The present licensing is fraught with uncertainty, lacking in stability, and, at times, rationality. The process needs to be reshaped to instill discipline, to reestablish a sound framework for regulation of nuclear facilities and to eliminate to the maximum extent possible the instability which currently exists. This should be accomplished in a manner which affords the public a better opportunity to have meaningful and timely input into the licensing process. Perhaps most important, reform of the licensing process is needed to improve the focus on the safety of the plants.

The reality of licensing today is that the process has devolved into what one member of our committee has termed a "costly procedural labyrinth" where the search for an error-free legal record has become paramount, reducing to secondary importance the quest for sound technical decisions. The end result has been to reduce some aspects of the hearing process to an exercise in trivia, and, more important, to divert Commission and industry expertise and knowledge from areas of inquiry and review which might further enhance the safety of nuclear power facilities in favor of an agenda which sometimes loses sight of the purpose of regulation - protection of the public health and safety and of the environment.

Both the NRC and DOE, of course, recognize the need for licensing reform. The bills which they have drafted and which have been submitted to the Congress for consideration demonstrate this recognition. It is our hope that the hearings today will see fruition in the passage of legislation which will bring greater stability to the licensing process and thereby enhance the public health and safety.

Let me now turn to the issues involved in licensing reform. Both proposed bills address four major areas of licensing reform - (1) single-stage licensing; (2) early site reviews and approval; (3) approval of designs; and (4) licensing stability. My comments on the proposed reform legislation generally correspond to those four areas. In addition, attached to and incorporated in this testimony as Attachment A is a Memorandum dated May 7, 1985, which comments on and responds to a March 11, 1985 letter from Commissioner James K. Asselstine to the Chairman of this Subcommittee. In his letter, Commissioner Asselstine discussed the reasons why he did not support the legislation proposed by his four fellow Commissioners.

Combined Construction Permit/Operating License - Single-Stage Licensing

Fundamental to any reform of the licensing process must be a provision for single-stage licensing. There is a compelling need to allow a facility to be licensed for construction and operation in a single proceeding, and thereafter to proceed through construction into operation without the necessity of undergoing a second hearing at the operating license stage.

The time to decide whether a plant should be built, and the design and safety parameters which it must meet, is when the plant is involved in what today is called the construction permit process. We believe it is possible to provide sufficient information and criteria when a plant is proposed to enable the NRC to determine at that time whether the facility can be constructed and operated in conformity with the Atomic Energy Act and Commission regulations. The opportunity for the public to provide input to the process and to challenge the plant clearly should be afforded at a stage where such input is meaningful - before the facility has received authorization for construction. Thereafter, it should be the responsibility of the regulatory agency, through its staff, to determine whether the facility has been constructed in accordance with the license. To leave open for challenge until plant construction is almost complete and operation is imminent such fundamental issues as whether the basic design is safe, whether the site is suitable and other important technical and operating parameters introduce uncertainty and unpredictability without contributing to safety.

Moreover, parameters and requirements for matters such as assurance of quality of construction and emergency planning also can be established before the facility is approved for construction. Inspections, tests and analyses, and the acceptance criteria therefor, can be established at the initial stage of the licensing process - before the combined construction permit/operating license is issued. Thereafter, the regulator - the NRC - should assure compliance with the license through its inspection and testing processes, without the necessity for redundant hearings.

In short, we believe a single license - combining a construction permit and an operating license - should be authorized, and only one hearing allowed prior to the grant of such license before construction begins. No further hearings should be mandated, although procedures should be available for bringing to the attention of the NRC alleged violations of the license. In this regard, the Commission regulation currently in existence in 10 C.F.R. § 2.206 seems to be appropriate and adequate. If, contrary to our position, an opportunity for hearing is provided when the plant is ready for operation, we believe there needs to be a strict standard involving good cause before such hearing takes place. The Commission in such case should have the flexibility to determine whether the hearing must precede commencement of operation in order to provide reasonable assurance of public health and safety or common defense and security.

The approach to single-stage licensing taken in both the NRC proposal (NRC Proposal, § 101, amending § 185 of the AEA) and the DOE proposal (DOE Proposal, § 103, amending § 185 of the AEA) are sound. Under the DOE approach, after a facility has been constructed pursuant to a single construction and operating license (COL), the COL holder notifies the Commission of its readiness to operate the facility. After Federal Register notice, a thirty-day period is provided during which any person may file written objection to operation on the basis of nonconformity with the license. The bill spells out the standard to be applied for a hearing to be granted. The NRC bill takes a similar approach, although the hearing threshold is described in slightly different words. The NRC language in this regard appears to be more precise. Both bills also give the Commission needed flexibility to determine the timing of the hearing. We strongly support the concept and approach of both the NRC and DOE bills in this area.

Both the NRC and DOE proposals set forth the degree of information which must be contained in the application for COL. The NRC bill provides (proposed Section 185(b)) that a COL shall issue "if the application contains sufficient information to support the issuance of a combined construction permit and an operating license in accordance with the regulations of the Commission and the Commission determines that there is a reasonable assurance that the facility will be constructed and will operate in conformity with the application, the provisions of this Act, and the rules and regulations of the Commission." The DOE bill provides (Section 185b(1)) that the application must contain "sufficient information to enable the Commission to determine there is reasonable assurance that the facility will be constructed and will operate in conformity with the application, the provisions of this Act, and the rules and regulations of the Commission." By providing that the degree of information to be contained in the application must be "in accordance with" regulations of the Commission, the NRC bill directly assures that the Commission has ultimate control on the degree of detail necessary to issue a COL. The section-by-section analysis which accompanied the Commission bill clearly states that "with the current level of development it is possible to establish the design in sufficient detail before construction commences and hence to identify the inspections, tests and analyses which need to be performed" to make the required safety findings. We agree with this statement of the Commission, as well as the observation in the section-by-section analysis that "appropriate completeness of the applicant's facility design" is a requirement in order to specify the inspections, tests, analyses and acceptance criteria as an integral part of the COL.

Under the language of the proposed bills, what should be required is a degree of information sufficient to enable the Commission to determine whether the plant, if built in accordance with the application, can operate without undue risk to the public health and safety or common defense and security. The workable level of design detail required to obtain a combined COL should be developed through implementing regulations and guidance.

Both bills also call for the single-stage COL to identify the inspections, tests and analyses which must be performed and the acceptance criteria therefor, to confirm that the plant as constructed conforms to the terms of the license and that the plant will operate in accordance with the license (and hence to the requirements of the AEA and Commission regulations). Such inspections, tests and analyses, together with specific acceptance criteria, can be established not only to assure proper construction, but for such matters as management structure, quality assurance, emergency planning, etc. In this way, the inspections, tests and analyses to be performed and the specific acceptance criteria to be met will be considered during the combined COL hearing and would be included within the license. Thus, at an early stage, the public would have an opportunity to participate when a meaningful contribution could be made.

The DOE bill also would have the Commission incorporate in the COL "a phased-approval procedure for construction quality assurance." This provision is similar to the approach recommended by Commissioner Asselstine in his March 11, 1985 letter to Senator Simpson, wherein the Commissioner recommended utilizing "specified check points to assure adequate quality as construction proceeds." Although no such provision is contained in the NRC bill, we believe these proposals are in line with the intent of the NRC proposal.

In sum, the safety determination that a plant is designed and can be constructed and operated in conformance with the conditions of the license should be made by the

Commission when the single-stage license is issued. The issuance of that license will be based on extensive Commission review and will come only after opportunity for public hearing.[1] The license also should detail the inspections, tests and analyses which must be performed, and the acceptance criteria therefor, which must be met, in order to provide reasonable assurance of public health and safety. Such provisions, together with the ongoing reviews, inspections and tests made by the Commission during construction to verify that the construction conforms to the COL and that other preoperational requirements have been met, are entirely adequate for the NRC to provide reasonable assurance of the public health and safety and common defense and security. Any further proceeding prior to commencement of operation should be only for good cause as defined in the proposal. The proposed legislation and accompanying analysis should be explicit in this regard if single-stage licensing (with the resources committed in reliance thereon) is to be a reality.

---

[1] The proposed amendment in both the NRC and DOE bills to Section 189 of the AEA would eliminate the present requirement for a mandatory hearing even if no hearing is requested by a member of the public. We support this proposal.

Early Site Review and Approval

Both the NRC and DOE proposals contain provisions which would create statutory authority for issuance of early site approvals and would confirm and strengthen existing Commission practice of conducting an early site review at the request of an applicant. (NRC Proposal, § 103, adding new § 193; DOE Proposal, § 102, adding new § 194 to the AEA). We strongly endorse and support the concept of early site approval.

The NRC proposal provides for deferral of payment of fees otherwise payable on application filing or issuance of an early site approval (Proposed § 193b). The costs that would have been defrayed otherwise by the fees would be allocated to license applicants who propose to use the approved site. If no application for such use is filed within the initial ten-year period of the site approval, the fee would be payable by the applicant for the site approval. No similar provisions are contained in the DOE proposal.

We support the NRC concept of deferral of fees since we strongly believe that such deferral provides an important incentive to the investment of resources necessary to obtain early site approval. We also support the Commission proposal wherein the legislation would provide merely for deferral of fee payments, leaving to the Commission the determination of payment and allocation of deferred licensing fees.

Both the NRC (Proposed § 193d(2)) and DOE (Proposed § 194(c)(2)) proposals provide for renewal of an early site approval for periods beyond the initial ten-year period. In this regard, we prefer the DOE approach wherein such renewal is to be granted unless the Commission finds that significant new site information has become available such that the site will not comply with the Act or Commission regulations. In order to promote predictability and stability in the licensing process, this presumptive renewal of an early site permit following its initial ten-year term, subject to the significant new information requirement, is desirable. The renewal should not be an occasion to re-review issues resolved prior to issuance of the original site permit, as may be the case in the Commission's formulation of the renewal standard (Proposed § 193d(2)). At the end of the initial term, the NRC should review the site permit in light of any significant new information relative to the site. It should not, however, require changes to the permit, either during its effective term or upon review for renewal, unless it determines that such changes are necessary under the Commission's backfitting standard.

The DOE proposal states (Proposed § 194c(1)) that a site permit "shall be conclusive" with respect to a facility for which a license is filed utilizing such site. In contrast, the NRC proposal (Proposed § 193d(1)) provides that the site permit "may be referenced" in an application for a construction permit or combined COL. The NRC section-by-section analysis states that the effect of this provision is that matters resolved in the site permit review or licensing action will not be modified or reexamined as part of the later construction permit or COL review unless a strong evidentiary showing is made. We believe in this regard that the DOE language better states the intent. Challenge to the conclusiveness of a site approval only should be permitted in conformance with Commission backfit procedures.[2]

Approval of Designs

Both the NRC and DOE proposals (NRC Proposal, § 104, adding new § 194; DOE Proposal, § 105, adding new

---

[2] This recommendation also was made by the Commission Ad Hoc Committee for Review of Nuclear Reactor Licensing Reform Proposals (Ad Hoc Committee Report, December 15, 1982, p. 20).

§ 193 to the AEA) authorize the Commission to allow for approval of nuclear power plant designs whether or not a construction permit or a combined COL has been filed. We strongly endorse and support authorization for approval of designs independent of the CP or COL application.

The recognition accorded by the Commission to the benefits to be derived from standardized designs is particularly appropriate. Thus, we concur with the proposed Commission findings that licensing and construction will be facilitated and "public health and safety enhanced by the use of pre-approved nuclear power plant designs, particularly standardized designs" (Proposed Finding No. 3, § 2(a)(3)) and the Commission finding of "a need to encourage the development and use of standardized nuclear power plant designs because such designs can benefit public health and safety by concentrating the resources . . ., by stimulating standardized programs of construction practice and quality assurance, by improving training of personnel, and by fostering more effective maintenance and improved operation, and because the use of such designs can permit a more effective and efficient licensing and inspection process." (Proposed Finding No. 4, § 2(a)(4)).

Both the NRC and DOE proposals would authorize approval of the standardized facility designs or the design "for any major subsystem" which "represents a discrete element" of a nuclear facility (NRC Proposed § 194a; DOE Proposed § 193a). We support the idea that to achieve the maximum benefit the design approval concept should be applicable to less than an entire plant. We believe that the proposed legislation should be broadened to permit standardized design approval for an entire nuclear power plant, major portions of the plant (e.g., nuclear steam supply system, nuclear island, balance of plant, etc.) or any important component part as defined by the Commission. The AEA currently authorized licenses for production and utilization facilities, and in Sections 11(v) and 11(cc) the AEA defines production and utilization facilities to include "any important component part especially designed for such equipment or device as determined by the Commission." The flexibility inherent in this definition should be retained in the design approval provision.

In at least one respect we believe the Commission proposal with respect to approval of design to be too restrictive. The Commission proposal defines the term "standardized design" to mean a design which "is sufficiently detailed and complete" to support licensing or approval of a facility or a major portion of such facility (NRC Proposal,

§ 202). We support this concept. According to the section-by-section analysis, the Commission contemplates "development and use of substantially complete standardized designs." Unless the term "substantially complete standardized designs" means something different than "final as-built design," the suggestion that design approval requires substantially complete standardized designs is inappropriate. As indicated earlier in my testimony what is necessary is a degree of information sufficient to enable the Commission to determine whether a plant, if built in accordance with an approved design, can operate without undue risk to the public health and safety or common defense and security. Thus it is necessary to leave to Commission determination a precise statement of the degree of design information required.

Deferral of licensing fees is applicable to and appropriate for design approvals. In this regard, both the NRC proposal (Proposed § 194b) and the DOE proposal (Proposed § 193b) include fee deferral. As noted in our comments with respect to early site approvals, we believe deferral of licensing fees will act as a strong incentive to standardization, and we support the NRC and DOE proposals.

As in the case of early site approval, we prefer the DOE approach to the NRC approach with respect to renewal of design approvals. In order to promote predictability and stability in the licensing process, renewal of design approval should be presumptive. At the end of the design approval period, the NRC should review the design approval in light of any significant new information relevant to the design approved. The NRC should not, however, require any changes in the design approval, either during its effective term or upon review for renewal, unless it determines such changes are necessary under the Commission's backfitting standard.

The Commission proposal with respect to approval of designs states that any approval may be "referenced" in a later licensing proceeding involving such approved design (Proposed § 194d(1)). In contrast, the DOE proposal makes an approved design "conclusive" with respect to an application for a construction permit or a COL which meets the conditions of the approval (Proposed § 193d(1)). As in the case of early site approval, we understand the intent of the Commission to be the same as that of the DOE despite the difference in language, since the section-by-section analysis of the Commission states that all matters resolved in connection with design approval can be used without need of re-review except in connection with a substantial evidentiary showing. We believe the DOE language is preferable to properly reflect the legal effect which the approval should have. Use of the word "conclusive" will make it clear that issues relative to the design of a facility may not be re-reviewed or raised when a plant design approval is utilized in connection with a license application.

The NRC bill provides that following issuance of a design approval, in any subsequent proceeding involving such approval, the Commission shall not modify any final determination of an issue that has been considered and decided unless certain standards are met (Proposed § 194e). It needs to be made clear that any such modification to a design approval only should take place in a proceeding to amend design approval.

The Commission proposal authorizes a variance from one or more elements of a design approval if it is determined that the variance will comply with the AEA and Commission regulation (Proposed § 194g). The variance would be limited to the particular license for which the variance has been requested. Although such a variance provision is necessary, we do not believe the Commission proposal is adequate. Provision should be made to allow deviations from a design approval without prior Commission approval unless such deviations involve a change in the technical specifications incorporated in a license or an unreviewed safety question. In this regard we support the provisions contained in the DOE proposal relating to deviations (DOE Proposal, § 193f).

Licensing Stability

From the standpoint of the operating utilities and those utilities with plants currently under construction, and from the standpoint of stability of the licensing process over the long haul, backfitting is the single most important aspect of licensing reform. There is a consensus, clearly agreed to by both DOE and the NRC, that backfitting is a regulatory issue which needs to be addressed.

The DOE bill contains a specific backfitting provision setting forth the substantive treatment which the NRC would be required to utilize in any such regulation (DOE Proposal, § 104, amending § 187 of the AEA). Thus, the DOE bill establishes a specific backfit standard and specifies the factors the NRC must include in its evaluation and approval or disapproval of proposed new requirements. In addition, the DOE bill would require a "centralized, systematic and documented review process to evaluate and consider a proposed change."

The NRC proposal only addresses regulatory stability in the context of the COLs, site permits and design approvals authorized by the new legislation. For those licenses, the bill would require the Commission to establish procedures and criteria for control of the application of new requirements (Proposed § 203a). Backfitting controls for other licenses (such as construction permits or operating licenses issued under current law) are not included and would be left to Commission regulation. With respect to COLs, site permits and design approvals, the NRC bill contains standards which should promote regulatory stability. Thus, in each case, a modification to be imposed must be based on significant new information, must be required to protect public health and safety or common defense and security, and must substantially enhance public health and safety or common defense and security by improving overall safety of facility operation.

We believe it is desirable for the Congress to provide the Commission with direction and legislative guidance in the backfit area. Accordingly, we strongly support the approach to backfitting which is embodied in the DOE bill.[3] We would note, however, that the standards for regulatory stability contained in the NRC bill are appropriate.

---

[3] Last year, the industry supported the backfitting provisions of H.R. 1029, the Broyhill bill introduced in the House of Representatives, and continues to support that bill.

As a legal matter, there seems to be little question[4] that the NRC currently possesses authority to adopt regulations with respect to backfitting. In fact, the Commission has had a backfitting regulation in place for many years - 10 C.F.R. § 50.109 - but it has not enforced that regulation. The Commission also has been considering administrative reform of its backfit rule for the last four years but has yet to finalize a revised rule.

We are concerned that unless Congress not only directs the Commission to establish criteria and procedures for controlling backfits but also specifies the parameters of those criteria and procedures, the current situation may not be relieved by the Commission through rulemaking. Appropriate legislation is desirable since it would provide a clear expression of Congressional intent and a continuing impetus for the NRC to enforce the backfitting criteria and procedures.

---

[4] One member of the Commission's Ad Hoc Committee for Review of Nuclear Reactor Licensing Reform Proposals questioned the legality of the Commission adopting, without authorization by Congress, new backfit regulations which are very similar to the legislative proposals of the DOE in this area. (Ad Hoc Committee Report, March 22, 1983.)

As stated by the Commission's Ad Hoc Committee for Review of Nuclear Reactor Licensing Reform Proposals ("Commission Ad Hoc Committee"), everyone agrees "on the value of requiring a disciplined, documented justification for the imposition of new or modified requirements and high level review of each such justification" (Ad Hoc Committee Report, March 22, 1983, p. 5). It is just such a disciplined, documented process that is lacking today.

A sound backfitting provision should contain the following four elements: (1) the standard to be applied in order to establish when a backfit will be required; (2) a definition of backfitting which is comprehensive in nature; (3) the items to be analyzed in determining when the standard has been met; and (4) the procedure to be utilized in determining when the standard has been met.

Any backfit legislation should include a single backfitting standard applicable in all situations where backfitting questions arise in proposed modifications of issued licenses, of design and site approvals and in renewal of such approvals. Thus, the standard should be applicable both to operating plants and those in the licensing pipeline. Further, the rule should cover the proposed imposition of backfits via rulemaking, license amendments and new or revised Staff guidance.

We favor a standard for backfitting under which backfitting would require a clear demonstration by the Commission that the proposed backfit will substantially enhance public health and safety as a result of improved overall safety of facility operations, and that such improvement is justified when considered over the remaining life of the facility. An exception should be provided when the Commission determines a backfit is necessary immediately to protect the public health and safety or common defense and security.

Backfitting should be broadly defined to include not only modifications or additions required by the Commission, after a license (including a construction permit) has been issued, to structures, systems or components of a facility, but also changes proposed to procedures pursuant to which the facility is to be constructed or operated, or the organization required to construct or operate a facility. Further, any definition of backfitting should make it clear that backfitting includes new analysis or testing requirements which would impose substantial costs on licensees or approval holders.

The backfitting provision also should set forth appropriate factors which must be taken into account by the Commission in its analysis before determining that a backfit is warranted. Finally, a proposed backfit legislation should require a systematic and documented review process before a backfit can be imposed.

A joint committee of the Atomic Industrial Forum, Edison Electric Institute and American Nuclear Energy Council and a utility group known as NUBARG (an acronym for Nuclear Utility Backfitting and Regulatory Group) have been considering for over three years the matter of a desirable backfit rule. While we have minor difficulties with certain wording of the DOE proposal, we believe the DOE approach to be sound. As I noted, however, the regulatory stability standard in the NRC bill, which applies only to COLs, site permits and design approvals, is appropriate as a standard against which to measure proposed backfits.

Mr. Chairman, I appreciate the opportunity which the subcommittee has afforded me to testify this afternoon.

MEMORANDUM

Re: Comments on Letter from Commissioner
Asselstine to Senator Simpson Concerning
NRC Licensing Reform Proposal of 1985

On March 11, 1985, Commissioner James K. Asselstine, of the Nuclear Regulatory Commission, sent a letter to Senator Alan Simpson, Chairman of the Subcommittee on Nuclear Regulation of the Senate Committee on Environment and Public Works, discussing the reasons why Commissioner Asselstine cannot support the Commission's proposal for legislation concerning design approvals, early site approvals and combined construction permit and operating license ("CP/OL") (the "Nuclear Power Plant Licensing and Standardization Act of 1985"). The purpose of this memorandum is to comment on the letter of Commissioner Asselstine. Analysis of that letter shows that the conclusions by the Commissioner that the proposed bill would undermine current safety standards and unreasonably restrict the public's right to participate in licensing proceedings result from a misunderstanding by the Commissioner of the proposed bill and what it is intended to accomplish.

1. Commissioner Asselstine states:

> "The Commission has watered this down to require submission merely of 'sufficient information to support issuance of a combined construction permit and operating license.' The Commission has not explained why a combined CP/OL should require less information than the separately issued CP and OL."

Comment: Contrary to the Commissioner's statement, the combined CP/OL under the Commission's proposed bill will not require less information than the separately issued CP and OL. Nowhere does the bill state this, and the section-by-section analysis makes it clear that the contrary is intended. The bill itself would provide that the degree of information to be contained in the application must be "in accordance with the regulations of the Commission," thereby assuring that the Commission ultimately controls the degree of detail necessary. The section-by-section analysis clearly states that "with the current level of development it is possible to establish the design in sufficient detail before construction commences, and hence to identify the inspections, tests and analyses which need to be performed" to make the required safety findings. The section-by-section analysis further indicates that "specification of inspections, tests, analyses and acceptance criteria as an integral part of the combined construction permit and operating license cannot be accomplished without appropriate completeness of the applicant's facility design." Thus, the Commission states:

> "The level of design detail needed to establish such specification would define the essentially complete design which the Commission anticipates will be required for the combined construction permit application. The elements specified would necessarily address all important safety features of a plant, and the Commission would determine the level of detail necessary in the inspections, tests and analyses,

> and the acceptance criteria therefor. Thus, in order to qualify for license issuance, the applicant would be obliged to describe those features of the proposed facility with a matching completeness." (Emphasis added.)

The suggestion by Commissioner Asselstine that the combined CP/OL application be required to contain sufficient information to support issuance of both "a construction permit and an operating license" as opposed to "a combined construction permit and operating license" would establish an impossible standard to meet, and may raise antitrust questions. The statutory scheme recognizes this and specifies compensatory requirements for issuance of a combined construction permit and operating license - i.e., that inspections, tests and analyses, and the acceptance criteria therefor, be spelled out as part of the combined CP/OL application and license. Under current Commission practice, at the CP stage general architectural and engineering principles are established, and preliminary design information is provided to furnish the necessary assurance that the principles can be met. However, final design information and the inspections, tests and analyses, and their acceptance criteria are not spelled out. After the construction permit is issued, and while the plant is being constructed, tests and inspection procedures are developed and agreement is reached as to the criteria for acceptance of various aspects of the plant. However, under current practice even the Final Safety Analysis

Report at the operating license stage does not include all of these criteria. This process has inherent uncertainties and does not provide opportunity for public participation in suggesting additional inspections, tests or analyses at the front end when that would be most meaningful. Thus, far from being the restriction on information suggested by Commissioner Asselstine, the NRC proposal would increase the amount of information and detail necessary for obtaining a license while at the same time enhancing meaningful public participation. For example, take the case where intervenors are concerned that a plant will not have proper reinforcing steel bars in place after a concrete pour. Under the proposed bill, an intervenor could look at the proposed CP/OL and urge analytical requirements for design of the reinforcement, testing and acceptance criteria for ascertaining the design has been achieved, hold points on pours until inspection requirements are complete, and a requirement that pours only be allowed if the acceptance criteria have been met. In contrast, today we take a retrospective look, via contentions and allegations. Many similar examples could be provided from actual events which have occurred in licensing proceedings.

2. Commissioner Asselstine states:

> "The difficulties presented by this lowered standard are aggravated by the Commission's decision to delete the requirement in our previous bill for a

> preoperational review of the adequacy of a plant's construction, its readiness for operation, and the sufficiency of the emergency planning measures. The Commission has also declined to commit itself to preoperational reviews of significant safety issues not previously considered."

Comment: As discussed above, there is no lower safety standard or information requirement under the proposed bill.

Commissioner Asselstine's comment seems to suggest that after the combined CP/OL has been issued, the Commission will play little or no role in the review of the plant's construction, its readiness for operation or the sufficiency of emergency planning measures. The contrary is true. Because the Commission has an ongoing role in review of significant safety issues, as well as plant construction, readiness for operation and emergency planning, and because the tests, inspections and analyses, and acceptance criteria will be detailed at the front end, there is no need for the statute to require a special "preoperational review." Nothing in the proposed bill leads to a contrary conclusion or any conclusion that the Commission will not be checking on the adequacy of construction, the readiness of the plant for operation, or the sufficiency of such matters such as emergency planning. As noted by the Commission in its section-by-section analysis:

> "Specification of the required inspections, tests and analyses in the combined construction permit and operating license, i.e., before facility construction commences, would establish a clearly defined set of requirements governing the licensee and the Commission in discharging their complementary responsibilities as respects facility construction and operation. The Commission will be in a better position to assure that the plant has in fact been constructed and can be expected to operate in accordance with the license authorization. At the same time, license specifications of those requirements would enhance regulatory certainty for the facility licensee by prescribing what will be expected of the licensee in the construction and early operational phases of the plant and the bases for determining the adequacy of the licensee's performance. Importantly, this will also facilitate and make more effective public participation by providing information, prior to authorization of facility construction, of how the applicant's compliance with specified construction and operation requirements will be demonstrated following license issuance."

This makes it clear that the Commission will be utilizing the required inspections, tests and analyses, and the acceptance criteria as a detailed checklist to make certain that the applicant complies with its license obligations. With the increased discipline thus provided, the Commission Staff will know if, during construction, any requirement is not met and if the deviation affects safety. If the Commission Staff finds a deficiency during construction which affects safety, the Commission will be able to take the necessary action (including, where appropriate, enforcement action) to make certain that the plant conforms to the license and meets the statutory standards, Moreover, should changes to the inspections, tests and analyses, or acceptance criteria, arise which are of safety significance, opportunity for hearing will be afforded.

Near the end of his letter, Commissioner Asselstine recommends an approach utilizing "specified check points to assure adequate quality as construction proceeds." This suggestion is in line with the intent of the Commission bill and, in fact, is built into the concept of providing for inspections, tests and analyses, and their acceptance criteria as part of the combined CP/OL. However, it would be useful to add to the Commission bill a provision calling for a "sign-as-you-go" procedure for construction quality assurance so as to ensure the appropriate Commission review at appropriate and specified check points. Such a provision could also be expanded to allow the Commission to designate, in addition to its inspectors, engineering and inspection representatives similar to the manner in which such representatives are utilized by the Federal Aviation Administration.

3. Commissioner Asselstine states:

> "This [the provision calling for inspections, tests, analyses and acceptance criteria] ignores our unfortunate experiences in recent years with the unforeseen safety problems and with construction projects which have run into difficulties and have, in some cases, been cancelled."

Comment: This sentence seems to mix apples and oranges. In comment to 2 above, this memorandum states why the use of inspections, tests and analyses, and acceptance criteria are included in the Commission bill and why, contrary to Commissioner Asselstine's view, these will enhance the ability of the Commission to oversee construction adequacy and will provide for additional regulatory stability. One of the difficulties in regulation, as it relates to quality assurance, comes about because of lack of adequate definition up front of the quality assurance requirements and, in particular, the lack of agreement on acceptance criteria and adequately described inspections, tests and analyses which will be required. Although in some cases construction problems may have led to plant cancellations, the cause was a lack of discipline in the process. The Commission's proposed bill, with its requirement up front of tests, inspections and analyses, and of acceptance criteria therefor, should bring about the required discipline. It should be noted that many of the cancellations were for reasons not related to the construction difficulties or "safety problems." Many of the plants were canceled because of financial problems, lack of need for power, or a view of the regulatory process as a never ending morass which results in lengthening construction time without contribution to safety.

4. Commissioner Asselstine states:

> "The Commission would have done better to stick with its 1983 proposal which required it to make a formal finding that construction had been completed and that the plant would operate in conformity with the combined CP/OL, the Atomic Energy Act, and the NRC's regulations. It is worth noting that in 1983 the Commission recommended that it be required to conduct a supplemental review, prior to the commencement of operation, of any issues that were not considered in prior reviews of the facility. I see no basis to support the Commission's change in position on this important safety requirement."

Comment: Under the proposed Commission bill, the hearing for the combined CP/OL would include a hearing into the detailed requirements for the inspections, tests and analyses, and the acceptance criteria. If an intervenor believes more or different tests, etc. are required, or that the acceptance criteria are not adequate, he will be able to assert such position in the hearing process. This is more of a participatory right than he obtains today where intervenors have little or no role in determining what tests, etc. are to be conducted to demonstrate that the plant is adequate. The industry and the NRC now have sufficient experience to establish these tests and acceptance criteria up front, and the opportunity should be provided up front for intervenors and others to help establish what constitutes a complete set of requirements. This is more meaningful than the present system, unless delay is the object.

Having established these criteria up front, when it can be shown those inspections, tests and analyses and the acceptance criteria have been met and signed off by those required to inspect and review, the licensee should be entitled to start up the plant without further Commission findings. This, together with the existence of detailed checklists, provide not only the means but the incentive to do the job right. (As discussed below, this does not mean that the Commission will not review issues not previously considered prior to commencement of facility operation.) The entire theory behind a combined CP/OL is that the licensee is obtaining a license both to construct and operate a plant. Although operation only can occur if the licensee constructs the plant in compliance with the license, no second license, and hence no formal finding, is required to allow operation.

With respect to the comment on the conduct of supplemental review prior to commencement of operation, the Commission will monitor construction in order to determine that the inspections, tests and analyses have been properly performed, that the acceptance criteria have been met, and that the construction is adequate, such a process will continue throughout the course of construction and will include a review of issues which may not have been considered in prior reviews. Thus, the call for a "supplemental review" is superfluous. The time to review the work is while the work is being performed, not after the fact when the plant is complete and changes are more difficult to make. The process in the proposed bill recognizes this reality.

5. Commissioner Asselstine states:

> "The Commission's 1985 bill would place a very high threshold on the ability of a member of the public to obtain a hearing after the issuance of the combined CP/OL."

Comment: As noted by the Commission in its section-by-section analysis:

> "An opportunity for a second public hearing would be provided prior to commencement of operation of the facility if good cause exists therefor."

Commissioner Asselstine's comments equating the requirement of good cause with "a very high threshold" suggests that a second hearing should be held even in the absence of good cause. It is important to remember that at the front end detailed design information as well as the inspections, tests and analyses, and acceptance criteria are spelled out and an opportunity for hearing provided at that time. Moreover, the proposed legislation would substantially expand the potential scope of the hearing at the early stage, because inspections, tests and analyses, and the acceptance criteria would be subject to the hearing. Today, these are subject to public input, if at all, only through late allegations or the contention process at the operating license stage.

If there is to be some degree of stability and predictability in the licensing process, it seems appropriate to decide and consider issues prior to commencement of construction and prior to the investment of billions of dollars in the plant. Unless there can be a reasonable assurance that if the plant is built in accordance with the combined CP/OL and if the inspections, tests and analyses set forth in the combined CP/OL are performed and if the acceptance criteria set forth in the combined CP/OL have been met, that the plant will be permitted to go on line without a second hearing unless good cause for such hearing is shown, the entire concept of a combined CP/OL will be meaningless. The tests provided by the Commission bill to determine good cause are the appropriate tests. Unless there is a substantial dispute of fact that must be resolved, there is no reason for a hearing. Assuming such a substantial dispute of fact which needs resolution, the proposed bill requires either that the issue was not and could not have been raised in prior proceedings or that there is a nonconformance which would materially and adversely affect safe operation of the facility. If the issue could have been raised in a prior proceeding and was not, there should be no reason for a second hearing unless there is a nonconformance which materially and adversely affects safety. Conversely, if the issue does not involve a nonconformance with the combined CP/OL, there should be no reason for a second hearing unless the issue could not have been raised and resolved in a prior proceeding. One of the tradeoffs for greater specificity and detail at the front end of the process, and consequently for more meaningful public participation before the combined CP/OL is granted, is a limitation on a second hearing to those issues which could not have been decided earlier or which involve a nonconformance that affects safety. This is a functional, sensible process for public participation, not a "thicket of obstacles" as asserted by Commissioner Asselstine.

6. Commissioner Asselstine states:

> "As a practical matter, this thicket of obstacles will make it impossible for people living close to a plant to obtain a hearing on the issues such as emergency planning, adequacy of plant construction and readiness for operation, which are of greatest concern to them."

Comment: Under the proposed bill people living close to a plant would be able to obtain a hearing on issues such as emergency planning, adequacy of plant construction and readiness of operation. However, issues such as these would have to be addressed at the combined CP/OL hearing stage. We should apply the lessons of past experience with these issues in formulating hearing process improvements.

Any statutory scheme involving approval for construction of a plant cannot wait until the plant is already constructed before considering an issue such as emergency planning. With over eighty plants already on line, the Commission has had sufficient experience that it is in a position at the combined CP/OL stage to set the criteria and the inspections, tests and analyses which will be required in determining the adequacy of an emergency plan for the plant. For example, if one of the criteria for the emergency plan is the ability to notify all people within a five-mile radius of the plant of a radioactive release within a certain number of hours, this can be specified and the means by which one determines whether adequate notification procedures are in place can also be specified at the front end. It may not be possible five years in advance to list the telephone number of the local sheriff at the time the combined CP/OL is being issued, but it is possible to state that the telephone number of the local sheriff will be one of those numbers listed in the plan, and to have among the criteria for acceptance of the plant the listing of such number. The public participates at the front end as respects the foregoing by suggesting, for example, others who should be notified or the timeframes within which such notifications should take place. Thus, people living close to the plant can obtain a hearing on emergency planning issues. When the plant is ready to operate, if there is an alleged safety-significant nonconformance, a hearing would also be available.

However, it is anticipated that if an adequate job is done when the combined CP/OL is being issued, preoperational disputes respecting criteria conformance will be of limited scope and amenable to timely resolution.

7. Commissioner Asselstine states:

> "Indeed, I am persuaded that the Commission's efforts to silence the public will only stimulate opposition to future nuclear power plants."

Comment: There is no effort by the Commission "to silence the public." The effort by the Commission is to provide a logical statutory scheme whereby issues are resolved at the earliest possible time in the licensing process. Effective public participation is maximized when public input is taken into account prior to initiation of plant construction. Public participation after the plant has been constructed and is ready to operate clearly is not as meaningful, nor is such late participation consistent with the Commission's overall goal of bringing greater stability to the licensing process.

8. Commissioner Asselstine states:

> "In addition, I would point out that the combined CP/OL, early site review, and standardized design provisions of the bill contain a statutory limitation on backfitting. Putting aside my reservations about the wisdom of the Commission's proposed backfitting standard (conditioning a backfit on a showing that it will substantially advance public health and safety by improving overall plant safety),

> I recommend that the Congress not enact these provisions. As the Commission itself noted when it submitted its 1983 proposal, this is a problem which can be better addressed in the Commission's regulations. The Commission has had relatively little experience with formal backfitting standards."

Comment: The so-called "statutory limitation on backfitting" referred to by Commissioner Asselstine is a provision designed to accord stability to the critical regulatory approvals in the new licensing process. It is, moreover, a key element in the central aim of the bill to encourage industry to seek approval and then commit to the use of standardized plant designs. A standardized plant design approval is illusory unless there is a provision to give that approval stability by limiting later regulatory modifications.

The bill itself does not provide a statutory limitation on backfitting but, rather, requires a process whereby a decision to modify a previously approved design, site or CP/OL approval is made only after disciplined consideration utilizing an appropriate test. The bill stabilizes the process but does not make these approvals immune from modifications required for safety purposes. Backfitting for other licensing approvals is left by the bill to Commission regulation.

9. Commissioner Asselstine states:

> "To that end, I would recommend adding provisions to the bill to require that future nuclear power plant applications use essentially complete standardized plant designs which incorporate as key design elements greater simplicity, larger margins of safety, and other characteristics that promote more efficient construction, operation, maintenance and reliability. I would also recommend requiring that future plant applications use a centralized management approach for the construction project with specified check points to assure adequate quality as construction proceeds."

Comment: There is nothing in the record that supports a call for larger margins of safety. The current plants are safe and, indeed, even Commissioner Asselstine has registered votes in favor of issuance of operating licenses, thereby signifying that he believes the current plants provide reasonable assurance for the public health and safety.

With respect to requiring provisions which incorporate as key design elements greater simplicity, there is no way that you can legislate design simplicity. (It is anomalous that Commissioner Asselstine would entrust this task, but not that of setting a backfitting standard, to the legislative process.) The same is true for attempts to legislate more efficient construction operation, maintenance and reliability. With respect to the call for requiring a "centralized management approach for the construction project," as long as people who do the job are qualified, the NRC should not be dictating the type of contractual arrangement or construction organization necessary to do the job. Some organizations are capable of utilizing a centralized management approach while others can utilize a decentralized system with equally good effect. It is a mistake to believe that the NRC has sufficient competence and practical experience, or would be prepared to become accountable, for establishing project design or management.

The idea of specific check points to assure adequate quality as construction proceeds has previously been commented upon and is, indeed, a worthwhile suggestion which should be adopted.

10. Commissioner Asselstine states:

> "As a final matter, I would suggest that you consider combining legislation for future nuclear power plant licensing with legislation to extend and modify the Price-Anderson Act. Just as licensing legislation would provide the framework for any future nuclear power plants, legislation amending and extending the Price-Anderson Act, such as that recommended by the Commission in its December 1983 report to the Congress, would provide the basis for future public protection and compensation in the event of a nuclear accident in this country. It would seem logical to consider these two related legislative initiatives together."

Comment: The logical link seen by Commissioner Asselstine between licensing legislation and modification of Price-Anderson is not readily apparent. There is nothing in the proposed bill which concerns substantive requirements involved in the Price-Anderson Act, and the Price-Anderson

Act does not involve standardization. As the Commissioner himself notes, licensing legislation is to provide the framework of future nuclear plants, while Price-Anderson relates mainly to public protection and compensation in respect to nuclear plants already licensed. Insurance indemnity, moreover, is a much different matter than the framework for licensing and constructing of the plants, involving different disciplines, analysis and approach.

Conclusion

The main difficulty with the overall approach suggested by Commissioner Asselstine's letter is that, while the Commissioner is in favor of more standardization and greater technical and operational detail at the front end of the process, his suggestions generally would undermine realization of those aims. Any proposed licensing legislation must take into account the fact that no utility is going to invest the effort and resources required to build a nuclear plant unless it has reasonable assurance that once the plant is constructed and ready to operate, it will be allowed to operate in the absence of significant safety problems. If industry discipline and commitment at the front end of the licensing process are not matched by regulatory disciplines and commitments thereafter, no new nuclear plants will be built in this country. Any licensing reform legislation that does not take this into account will be inadequate.

Barton Z. Cowan

May 7, 1985

UNION OF
CONCERNED
SCIENTISTS 1346 Connecticut Avenue, N.W. • S. 1101 • Washington, DC 20036 • (202) 296-5600

Testimony of MICHAEL E. FADEN

LEGISLATIVE COUNSEL, UNION OF CONCERNED SCIENTISTS

On behalf of

CRITICAL MASS ENERGY PROJECT
ENVIRONMENTAL ACTION
ENVIRONMENTAL POLICY INSTITUTE
NATURAL RESOURCES DEFENSE COUNCIL
NUCLEAR INFORMATION AND RESOURCE SERVICE
SIERRA CLUB
UNION OF CONCERNED SCIENTISTS

Before the
SUBCOMMITTEE ON NUCLEAR REGULATION
of the
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

July 11, 1985

On NUCLEAR LICENSING LEGISLATION

I thank the Subcommittee for your invitation to appear today to discuss S. 836, filed on behalf of the NRC, and a similar DOE bill (not yet filed in the Senate), both of which would fundamentally revise those provisions of the Atomic Energy Act under which nuclear powerplants are licensed and regulated.

My testimony will attempt to answer four questions:

1) Will this legislation assure standardization of designs for future nuclear powerplants?

2) Does this legislation preserve the NRC's authority to diagnose and correct safety problems once a reactor is licensed?

3) Will this legislation fully protect the public's right to participate in NRC licensing decisions?

4) Will this legislation revive the nuclear option?

The answer to each of these questions, in our view, is "no".

The theme of this year's nuclear licensing legislation is standardization. All three bills filed to date — the NRC bill (S. 836, H.R. 1447), the DOE bill (H.R. 2488) and the Broyhill/industry bill (H.R. 1029) — have been touted as primarily aimed at encouraging the standardization of future reactor designs. This theme reflects a healthy (if belated) realization that many of the industry's recurrent problems stem from the "design-as-you-go" practices that have persisted since its early years.

But, more importantly, this emphasis on standardization also underlines the billwriters' need to deflect the controversy that has surrounded earlier legislative attempts to effectively exclude the public from the nuclear regulatory process. Unfortunately, these bills go at least as far as past years' proposals — in some respects, even farther — in cutting back the rights of citizens to have a role in the licensing of nearby reactors.

To the extent that their proponents focus on standardization, the effect of these bills has been grossly misrepresented. Far from simply encouraging standardized designs, these bills would fundamentally alter the balance in the Atomic Energy Act, adhered to by the Congress for three decades, in favor of public participation as a tradeoff for the preemption of state and local regulatory power in this area. As they stand, these bills only further entrench in the law the special treatment accorded the commercial nuclear industry — the only private industry already exempt from normal tort liability as well as state and local safety regulation. This special treatment, objectionable in the abstract, is certainly not merited by the industry's record.

My testimony today will not attempt to thoroughly analyze every provision of each bill. It will also not describe in detail the nuclear licensing process and how (if at all) that process relates to nuclear power's current de facto moratorium. Both of these topics were discussed at length in the testimony submitted on behalf of the same organizations in 1983, when Congress considered very similar bills. They are also treated extensively in the more recent UCS report "Safety Second: A Critical Evaluation of the NRC's First Decade", which I ask be made a part of the record of this hearing. All I will try to do today is highlight the major problems we see in these bills, and I will emphasize why neither of the two bills before you delivers what it promises.

1) These bills do not achieve standardization.

Standardization of nuclear powerplant designs, done correctly, is a progressive concept. It can provide safety benefits as well as time and cost savings. Most other countries long ago recognized this fact and embarked on programs of standard plant designs. UCS has supported standardization since at least 1978, and we still do. But this legislation is not necessary to make it happen, and this legislation will not make it happen.

The licensing process does not hamper the use of standardized designs.

These bills are neither necessary nor sufficient to cure nuclear power's ills. At the outset, it is important to make one crucial distinction: the root cause of the American nuclear industry's many problems is not the NRC's licensing process. As former Commissioner Peter Bradford told this subcommittee last session, "The NRC hearing process ranks very low among the issues that have brought nuclear power to its present situation. NRC hearings did not cause Three Mile Island. NRC hearings did not bring about the cancellation and default at the WPPSS units. NRC hearings had nothing to do with the quality assurance breakdowns at Diablo Canyon and Zimmer. NRC hearings are not causing the Midland containment to sink. NRC hearings are not even at the bottom of the cost overruns at Shoreham and Seabrook."

Most of these misfortunes stemmed from the industry's failure to finish designing its reactors before it starts building them. Its historic "design-as-you-go" approach has been responsible for many — if not the great majority — of the cost overruns and safety lapses that have made headlines in recent years. By hampering advance planning, making quality assurance immeasurably more difficult, and exacerbating the need for expensive change orders and reworks, this basic industry practice has done more to raise the costs and extend the duration of nuclear powerplant construction than an army of intervenors could ever do.

This legislation is also unnecessary because NRC already has all the legal authority it needs to license standardized plant designs — a point the agency admitted in its 1983 Congressional testimony. Under NRC's rules (10 C.F.R. Part 50, App. O pars. 5, 7), any standard design it approves can be referenced in a license application, and no other party can subsequently challenge the design's validity. In fact, NRC has all but approved two standard designs submitted by General Electric and Combustion Engineering. Westinghouse is developing an advanced pressurized water reactor design, which it expects to submit for NRC approval. It is hardly the case that NRC has erected barriers to standardization; instead, the industry, for reasons of its own, has until recently insisted on building custom-designed plants.

These bills do not rule out "design-as-you-build" plants.

The key element of genuine standardization is simply requiring the applicant to submit a *complete*, final design before construction begins. Only a complete design permits meaningful NRC review, advance resolution of safety issues, and a clearly-scheduled construction process. Once NRC makes design-in-advance a legal requirement, economic pressures will render custom designs all but obsolete. However, neither the NRC nor the DOE bill requires NRC to license only plants that use a standard design. Nor does either bill require NRC to receive and approve a final plant design before it issues a construction permit or a "1-step" license. In other words, neither bill guarantees standardization or stops the "design-as-you-go" process.

The DOE bill does not even define what is meant by a standardized design. The NRC bill (sec. 202) defines a "standardized design" as "a design which the Commission determines is sufficiently detailed and complete to support licensing" of a commercial reactor "or approval of a major portion of such a facility...and which is usable for a multiple number of units and/or at a multiple number of sites without reopening or repeating the review." Since NRC has previously used its discretion to allow reactors to begin construction after reviewing only a "conceptual" design outline, this definition gives little confidence that the Commission will ever insist on a complete, final design.

In fact, industry leaders appear to believe that NRC should accept for a construction and operating ("1-step") license roughly the same level of design detail — in the future called "design criteria" — that it now requires for a construction permit. Under this process, the detailed engineering drawings would be developed in a later "design implementation stage". (The trade press has quoted technical staff of a prominent architect-engineer as suggesting that "at least" 20% of the plant's engineering would have to be completed before NRC issues a 1-step license — which would amount to no improvement at all over past practices.) Thus it is clear that neither bill would prohibit NRC from approving "designs" and licensing plants on the basis of 20-25% of the final plant design — an indefensible compromise in any bill that purports to encourage design standardization.

These bills would let NRC standardize designs with unresolved safety issues.

This legislation fails to recognize that standardization only improves the safety of plants if the design that is standardized has resolved the safety problems that have persisted in the custom-designed plants. Neither bill directs the NRC to reject a design unless all outstanding safety issues have been resolved. This omission would allow the NRC to institutionalize, in a standard design, the avoidance of the final resolution of generic safety issues that has characterized its approval of custom designs for two decades. If Congress truly wants to get this industry's house in order, no single step would have greater impact than to direct NRC to approve only complete, final plant designs that resolve all outstanding safety issues.

The bills insulate standard designs, once approved, from future upgrades.

Although both bills add little to NRC's authority to approve standard designs, they do restrict the agency's authority in certain dangerous ways.

Both bills would make it very difficult to raise any serious design issue once NRC has approved a standard design, either in a subsequent plant license proceeding or in an amendment to the design approval itself, regardless of whether the particular issue was litigated in the original design proceeding. The proponent of reopening must show that any proposed design modification is "required" to protect the public health and safety — a tall order, when even the NRC needs a great deal of research to fully analyze many emerging safety issues.

By also demanding that any design modification must "substantially enhance" the public health and safety by "improving overall safety" of plant operations, the NRC bill redirects the agency's focus from the reliability of any individual plant safety system to the more amorphous calculations of "overall" plant safety that are easily manipulated in a probabilistic risk analysis.

The DOE bill would apparently make a design approval "conclusive" for 10 years, no matter what information is later discovered. It is extremely ill-advised to statutorily prohibit the prompt correction of design mistakes.

Should NRC have licensed clones of TMI-2 immediately after the accident? This language would on its face ordain just such a result, by precluding the Commission from ordering changes in a design it had previously approved.

The NRC bill makes the design approval effective for 10 years, with a single 10-year renewal granted almost automatically. The bill shifts the burden of proof to the public to show that the design does not meet current safety standards. Under current law, the burden would remain with the approval-holder to show that the design still meets those standards — a potentially difficult burden, given the many new safety issues that arise during any 10-year period of reactor development.

The DOE bill goes even further, allowing an infinite number of 10-year renewals for design approvals with a similar shift of the burden of proof. Neither bill contains a "due diligence" requirement to assure that a design approval-holder is making its best efforts to upgrade the design. The net result is to encourage NRC to "grandfather in" obsolete designs for decades.

Both bills also subsidize the nuclear industry by directing NRC to defer payment of the application fee for design approvals until the design is actually used, or until the end of the 10-year approval period. This amounts to an interest-free loan of millions of dollars to companies like Westinghouse and General Electric -- hardly the most needy recipients of scarce federal credit.

Section 193f of the DOE bill would effectively nullify all restrictions in an approved design or operating license. This remarkable provision expands a clause in NRC's rules to allow licensees, at *their own* discretion and without notice to NRC, to deviate from "any aspect of" the approved design unless the *licensee* determines that the deviation involves a change in technical specifications or an unreviewed safety question. We can confidently predict that licensees will not be overly strict in interpreting these standards, since, as Saint Benedict observed 500 years ago, it is far easier to beg forgiveness than to ask permission.

Finally, we must point out that, while the scope of the NRC bill is generally restricted to light-water reactors, the DOE bill would also apply to designs for breeder reactors and reprocessing plants -- two relatively untested and possibly even more dangerous types of nuclear facilities. The bill's procedural shortcuts and backfitting constraints are entirely inappropriate when not one commercial breeder reactor or reprocessing plant is under serious consideration, much less operating in this country.

2) These bills unwisely limit the NRC's ability to enforce its safety rules.

The NRC and DOE bills do not merely "encourage" design standardization, as their supporters claim. As the previous section explained, their purpose is to make standard designs — and, for that matter, many other licensing actions — very difficult to modify even when serious safety issues later arise. This attacks the NRC's own ability to enforce the Atomic Energy Act as well as the public's faith that the highest safety standards are being observed. In this respect, the legislation moves far beyond a prudent, rational policy of standardization and becomes a mechanism to insulate the industry from necessary safety improvements.

The June 9 failures of perhaps 17 separate pieces of equipment at the Davis-Besse (OH) reactor, and the tortuous chronology of NRC indecisiveness that led up to that incident (revealed through a prompt investigation by the House Subcommittee on Energy Conservation and Power) highlight the already inadequate level of NRC's oversight of commercial reactors. In brief, NRC's internal unwillingness to force the licensee to make important post-TMI improvements combined with the licensee's own opposition and obfuscation to delay the installation of a highly reliable auxiliary feedwater system. When several other pumps and valves failed to operate as expected, Davis-Besse was faced with the beginnings of a Three Mile Island-like accident. Fortunately, the operators reacted quickly and prevented a sustained loss of cooling water.

This incident illustrates why any attempt to restrict NRC's power or willingness to enforce stringent safety standards can have potentially devastating consequences. Viewed in that light, the provisions in both these bills, but especially the DOE bill, that limit NRC's legal authority to order changes in the designs, hardware or operations of nuclear powerplants are worse than mischievous.

Backfitting

Under Section 104 of the DOE bill, no change in the design, construction, operations or staffing of a plant could be required unless the Commission finds that it will "result in a substantial improvement in overall safety of facility operation". This improvement must be "justified when taking account of the remaining life of the facility". The NRC bill uses virtually identical language to restrict the modifications to an approved plant design that NRC can order. The DOE bill also directs the NRC to "establish a centralized, systematic and documented review process to evaluate and consider a proposed change."

Industry advocates like to use the term "backfits" to describe changes that NRC orders after a plant has received its license (and in some cases its construction permit). This term is used very loosely and, in our opinion, inaccurately by licensees who claim they have spent large sums of money on NRC-required improvements. The overwhelming majority of upgrades required in plants are not a result of applying new regulations to increase safety. They are needed when it becomes apparent, too often belatedly, that the plant does not in fact meet the regulations which it supposedly met when it was licensed — that is, the changes are needed to restore the level of safety that was originally assumed.

Robert Minogue, the NRC's director of research, explained in a 1979 internal memorandum how the need for "backfits" resulted when reactor designs went from 60 megawatts to almost 1200 megawatts in little more than a decade:

"This rapid increase in power levels occurred without obtaining any substantial operating experience on the nuclear plants at intermediate levels prior to increasing the size to higher levels. * * * I think that much of the racheting of regulatory requirements for the operating plants about which industry has complained has been a direct result of the fact that the unduly rapid push to larger sizes has resulted in what amounts to a generation of prototypes...this situation was almost inevitable given the substantial extrapolation from the early technology."

Alvin Weinberg, an industry pioneer since the 1940's, recently reflected on the developmental path the industry took and how it has led to numerous backfits:

"I often have felt that we went too fast in our conventional light water reactor development, that much of nuclear energy's travail would have been avoided had we moved more deliberately...if we build reactors too quickly we have no way of knowing whether the system will last anywhere near thirty years, nor can we incorporate lessons learned in earlier reactors into later ones without expensive backfits. This is now happening with many light water reactors--steam generators and pipe cracking may limit their lifetime seriously, even though we have learned ways of dealing with these problems."

Most of NRC's safety standards are very vague. Many consist of little more than platitudes: thou shalt be protected against fires, thou shalt have a reliable system for decay heat removal. There is often very little pre-operational review of the manner in which a given plant meets these standards. Applicants' commitments are accepted as a basis for licensing. Later, after an incident such as the recent failures at Davis-Besse or through research results, NRC may learn that one or many plants are not adequately protected against a certain hazard. It must then order design or operational upgrades so that each plant will meet the minimum requirements of the existing regulations. This is not a "backfit" in any objective sense, because it is necessary to comply with the standards which the plant was thought to have already met.

Both bills would bring even these clearly necessary upgrades to a screeching halt. They would classify design or hardware changes that are necessary to comply with existing safety regulations as "backfits", and would make NRC follow an onerous, time-consuming process simply to require a plant to meet the standards which it should have met when it was licensed. As the Davis-Besse history illustrates, NRC has already gone overboard in its zeal to avoid ordering needed improvements. To tie the agency's hands further would clearly be contrary to the public interest.

Despite repeated requests, neither DOE nor NRC has furnished a single example of an unnecessary backfit. Under NRC's procedures, the licensees have the right to dispute any backfit, and they certainly have the resources to exercise that right. Since in each case they have already accepted NRC's judgment, they should not be heard to complain now.

By their reliance on the phrase "improved overall safety", both bills also implicitly require all backfits to be justified by a probabilistic risk assessment (PRA) that analyzes the major accident sequences involving the entire plant. PRA's are complex quantitative analyses, based on thousands of sometimes arbitrary and unverifiable assumptions, that can be manipulated to reach a predetermined result. They are subject to overall uncertainties of such enormous magnitude that they cannot furnish a sound, independent basis for regulatory decision-making. Instead, PRA's provide the illusion of precision — an illusion that can never be verified simply because their great complexity and cost render PRA's totally inaccessible to public review and testing. (In fact, simply submitting a PRA can stymie NRC's decision-making process for as much as two years while the agency, relying on the national laboratories, goes about the laborious task of reviewing it in detail.)

These points have been made so many times by technical experts, including members of the NRC's own Advisory Committee on Reactor Safeguards, that one can only conclude that both agencies' reliance on PRA as the determining factor in backfitting decisions is a deliberate attempt to simply stop any more backfitting. In September, 1982, ACRS members Myer Bender and Jeremiah J. Ray advised the NRC: "The claims for PRA concerning its ability to assess public safety risk are little more than a sham that will hide the fact that the basis for safety will always depend upon the judgment of a few individuals." Because, as Bender and Ray point out, PRA's cannot accurately function as an indicator of overall safety, no licensing "reform" should ever explicitly or implicitly require their use.

The DOE bill's directive in the DOE bill to "justify" the backfit by considering the remaining life of the facility is presumably based on either the dubious assumption that the probability of an accident is lower when the remaining plant life is shorter, or the crass fiscal reality that the cost of safety improvements may measurably reduce an aging plant's profitability. This clause would have the pernicious affect of mandating a lower standard of safety for the oldest reactors — those most likely in need of upgrading.

In summary, both backfit provisions are essentially surrogates for prohibiting backfitting altogether. Both bills would effectively legislate a presumption against modifying operating plants to incorporate new information on safety issues -- the opposite of what the Kemeny Commission recommended and what should be the rule. Absent compelling reasons to the contrary, important safety improvements should be required in the current generation of reactors. After all, they — rather than any hypothetical future reactors — pose the real risk to the public.

Finally, the NRC itself is nearly ready to adopt a similar but more tightly drawn backfit rule. Congress should decline to enter this highly technical controversy, and instead should direct the NRC to move faster to resolve the many remaining generic safety issues.

Cost/Benefit Balancing

Both the DOE bill (finding 7) and the NRC bill (finding 9) introduce the concept that NRC shall specifically consider costs in setting safety standards. Although NRC has recently begun to overtly employ a cost/benefit analysis in regulatory decisions, there is a very serious question as to whether this approach is consistent with the Atomic Energy Act or represents sound regulatory policy. We believe that it is neither.

Fundamentally, cost/benefit analyses do not provide an honest basis for nuclear safety decisionmaking. They are very likely to be used to forestall safety improvements indefinitely. This Subcommittee will certainly recall some of the classic cost/benefit "analyses" done for water projects by the Army Corps of Engineers, whose juggling and rejuggling of the figures to justify a preset conclusion was legendary. Protection of the public from nuclear hazards is too important to be relegated to the same treatment.

The NRC (and before it, AEC) case law is remarkably consistent in its acceptance of the principle that costs are not a legitimate factor in safety decisions:

> "[I]n the safety sphere the evaluation of the risks attendant to reactor operation is not undertaken as an element of NEPA-type process by which costs may be traded off against benefits. Rather, the function of the evaluation is to ascertain whether the ultimate, unconditional standards of the Atomic Energy Act and the regulations have been met; e.g., whether the public health and safety will be adequately protected."
>
> Maine Yankee Power Company (Maine Yankee Atomic Power Station), ALAB-161, 6 AEC 1003, 1007 (1973).

As this excerpt indicates, adoption of a cost/benefit approach to nuclear safety regulation would represent a dramatic departure from the guiding regulatory principles the agency has consistently followed. While cost/benefit analyses have a certain superficial appeal (who can oppose preventing wasted expenditures?), this initial attractiveness cannot withstand close scrutiny. The central problem is that, while the cost of any safety improvement is relatively easy to calculate, the benefits cannot be accurately quantified.

The "benefit" side of the ledger is the reduction of risk. This reduction can only be measured by the use of a probabilistic risk assessment (PRA). However, as we explained previously, the bottom-line results of any PRA are enormously imprecise for the most serious accidents. The uncertainty bands range to a factor of 100 or more. This inherent lack of precision makes a quantitative balancing of costs against benefits essentially meaningless.

Cost/benefit analysis, like PRA, then becomes a tool that can be manipulated to produce a preselected result. This is a game which not everyone can play; even the NRC staff cannot easily analyze, let alone rebut, the massive PRA's that industry consultants dump on their desks, and the public is left completely on the sidelines. Given this basic mismatch, the adoption of a statutory requirement for cost/benefit balancing in safety decisions will tie the NRC's hands and offer the industry's lawyers a potent weapon with which to resist any regulatory action.

3) These bills undercut the public's right to participate in licensing decisions.

Major provisions in each of these bills would effectively deny members of the public their right to raise legitimate safety issues, particularly when a reactor is about to go into operation. These safety issues include such key questions as whether the reactor was constructed according to its design, whether the plant's operators and management meet NRC's standards, and whether emergency preparedness around the plant site is adequate. These issues are among the most controversial at a number of reactors now approaching final licensing.

We hardly believe that it will improve this industry's credibility to "streamline" the licensing process in ways that will reduce the public's right to be heard. But, more importantly, the effect upon the public's health and safety could be profound. If the public did not have a legal forum in which to document massive breakdowns in quality assurance and shortfalls in emergency planning, the Zimmer plant might now be posing a clearly unacceptable risk to those living near it. Zimmer is far from the only example of a reactor that was almost allowed to proceed to operation before the persistence of individual citizens led to the disclosure of serious defects; Comanche Peak, South Texas and Midland, among others, come to mind.

"Inspections, tests and analyses"

The gravest threat to the public is contained, ironically enough, in the seemingly innocuous phrase "inspections, tests and analyses" that is inserted in both the NRC and DOE bills. A recent D.C. Circuit Court of Appeals case (Union of Concerned Scientists v. U.S. Nuclear Regulatory Commission, 735 F. 2d 1437) held that NRC cannot deny the public an adjudicatory hearing on any issue that is material to its licensing decision. The Appeals Court, inter alia, rejected NRC's argument that the issue in question — the results of emergency preparedness exercises — fell outside the scope of the legally-required public hearing because it involved decisions that "rest solely on inspections [or] tests", a phrase used in the Administrative Procedure Act to exempt certain issues from formal hearing procedures.

In a bit of tricky drafting, the authors of both bills have essentially attempted to wrap every pre-operational issue in the "inspections, tests and analyses" cloak. They do this by directing that (in the NRC bill's formulation) "After issuance of a combined construction permit and operating license...the Commission shall assure through inspections, tests and analyses that construction is completed in conformity with the combined construction permit and operating license, consistent with the regulations of the Commission." The DOE bill has similar language.

If this language were enacted into the Atomic Energy Act, it very likely would be interpreted to allow NRC to designate every pre-operational safety issue — and certainly the construction quality assurance issues that have bedeviled a number of less careful utilities — to be decided in a non-adjudicatory fashion. The net result would be to preclude any inquiry into how well the plant was actually built, and how closely it conformed to the paper design, from the only forum in which the public can introduce its own evidence and cross-examine the utility's and the NRC's experts. (The NRC staff's track record on its own inspections and tests provides little assurance that construction failures will be discovered or acted upon promptly.)

"Good Cause" for hearings

Both bills also contain highly restrictive "good cause" language that effectively destroys the public's right to a pre-operational adjudicatory hearing, instead making such hearings discretionary on the part of the NRC. Given the pressures outside and within NRC — at times approaching hysteria — to avoid "licensing delays", it is highly likely that NRC will most often find no "good cause" to grant a citizen's request for a hearing; that has been the agency's pattern even under the present statute.

This "good cause" requirement is implemented by a thoroughly murky set of subfindings that will keep lawyers busy for decades, but which you can be sure will not be used to freely grant hearings even if the aspiring intervenor manages, in the 30 days the bills allow, to "set forth in reasonable detail the facts and arguments" upon which his request for a hearing is based. Formal discovery will presumably not be available during that period, placing the would-be intervenor in the Catch-22 position of not being entitled to a hearing without showing sufficient facts but not being able to discover those facts until he is granted the hearing.

As if this were not enough, the NRC bill makes its intentions perfectly clear by explicitly providing that a completed powerplant will commence operation "unless the Commission determines that good cause exists for delaying such operation." This, of course, precisely reverses the present NRC caselaw, under which (at least in theory) the applicant always has the burden of proving that its plant is built properly and ready to operate.

4) Enactment of these bills will further erode public confidence in the safety of nuclear power and the competence of the NRC.

The nuclear industry's more aggressive advocates claim that enactment of licensing "reform" legislation is necessary — although they admit it is not sufficient — to revive the nuclear option sometime in the next decade. They somehow believe that the public's — and the investment community's — faith in this technology will be restored if only the NRC can license plants in record time, stifle debate about their safety, and refrain from applying later lessons to earlier reactors. (These characterizations are, of course, extreme — but they are not unwarranted; these are the directions in which this legislation goes.)

We can safely say that no amount of this sort of regulatory "reform", however sweeping, will cure the nuclear industry's ills. The industry's safety, reliability, financial and public acceptance problems will not be erased by curtailing adjudicatory hearings or placing restrictions on backfits so onerous as to prevent the correction of serious safety defects.

On the contrary, enactment of this legislation will produce two negative results: it will simply hide many of the real problems from view and make it less likely that they will be addressed until after the next accident or near-miss, and the mere fact of its passage will further reduce public confidence in the technology and its regulators.

Both bills are one-sided. They move only in the direction of restricting the public's access to the licensing process. Nothing in either bill would lead, directly or indirectly, to an improved level of safety in any reactor, current or future. Rather, they encourage compromises on essential safety protections. The bills' standardization provisions do not require standardization and may have the perverse effect of institutionalizing incomplete, inadequate reactor designs.

The Kemeny Commission's paramount conclusion was that:

"To prevent nuclear accidents as serious as Three Mile Island, fundamental changes will be necessary in the organization, procedures, and practices -- and above all -- in the attitudes of the Nuclear Regulatory Commission and, to the extent that the institutions we investigated are typical, of the nuclear industry.

* * *

The Commission is convinced that [NRC's] attitude must be changed to one that says nuclear power is by its very nature potentially dangerous, and, therefore, one must continually question whether the safeguards already in place are sufficient to prevent major accidents."

These bills embody precisely the mindset and attitude condemned by the Kemeny Commission. They come closer to deregulating nuclear power than any proposals ever previously advanced. Congress should summarily reject them.

Industry advocates argue that they need regulatory "stability", and that word occupies a prominent place in the purpose clauses of both bills. In fact, the concept of "stability" highlights the central, unstated premise of the legislation now before you. It only makes sense to "reform" nuclear licensing as these bills propose if one has such a high level of confidence in the safety of current plants and the competence and vigilance of the NRC that one believes that citizen participation is expendable. As most recent public opinion surveys show, the American people do not have such a high level of confidence in this technology or its regulators. In our view, that lack of confidence is fully justified by the experience of the last quarter-century.

At this point in history the burden of proof must be on the nuclear industry. How do they explain Zimmer, Salem, Midland, Diablo Canyon and South Texas -- not to mention TMI-2, and now Davis-Besse? How many more examples are necessary to make the case for stricter safety regulation and strong citizen participation?

Before the Congress again puts its imprimatur on the current state of this technology -- and that is exactly what it would do by passing either of these bills -- it ought to pause and consider whether the moratorium the industry now faces should be the occasion for a fundamental reassessment of, not the licensing process, but the technology itself. As former TVA Chairman S. David Freeman acutely points out, "The truth is that the regulator only mirrors the technology." By its handling of these bills, Congress should send a clear message to the nuclear industry: Your problems are yours to solve; we will not paper them over with procedural fixes. You must achieve technological stability, at a level of safety the American people can live with, before we can even consider offering you regulatory stability. If the industry perceives and acts on that message, it will have reached a new level of responsibility and maturity.

Testimony of Texas Senator Grant Jones
before the Subcommittee on Nuclear Regulation
July 11, 1985

I am Senator Grant Jones of Abilene, Texas. I am Chairman of the Finance Committee of the Texas Senate. I am also Past Chairman of the the Southwest Regional Energy Council. I am here today representing the Southwest Regional Energy Council. The Council is an organization composed of State Senators and State Representatives from Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. Organized in 1975 by governors, legislative leaders, and state energy office directors, the Council provides a forum for the states of the Southwest to develop a regional consensus about public policy issues in the areas of energy production and environmental protection. Through the Council, the legislators identify emerging policy issues in these important areas that impact our region and develop prudent policies to address these issues.

The following testimony is submitted in support of the Nuclear Powerplant Licensing and Standardization Act of 1985. The Southwest Regional Energy Council respectfully requests that this testimony be made a part of the record of this hearing.

The Southwest Regional Energy Council commends Senator Simpson for introducing "The Nuclear Powerplant Licensing and Standardization Act of 1985" (S.836) and for his efforts in this area over the last several years. The Southwest Regional Energy Council fully supports Senator Simpson's effort to pass S.836.

The first two pages of my testimony consists of a copy of the Policy Statement of the Southwest Regional Energy Council supporting nuclear licensing reform. The Policy Statement was adopted by the unanimous consent of the Council members representing the member-states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. The Policy Statement summarizes the Council's reasons for supporting nuclear licensing reform. The rest of my testimony details, at greater length, the benefits that would result from early site review, site banking, and standardized designs of nuclear powerplants.

Policy Statement of the Southwest Regional Energy Council

Regarding Nuclear Power and Regulatory Reform

Background.

Historically, the demand for electricity has grown rapidly in the United States, doubling nearly every ten years. Demand is forecasted to continue to grow, though at a slower rate. New generating capacity will be needed to meet this future demand. The most abundant and secure fuels available to meet this future demand are uranium and coal. Nuclear power should be used in a manner consistent with energy needs and sound environmental standards to provide for future demand.

Actual construction time required for a nuclear power plant is about four to six years. With the current regulatory framework in the United States, an equivalent period is spent in regulatory proceedings, lengthening the time required for nuclear power plant installation to an average of ten to twelve years. The cost of building a nuclear plant in the United States is more than one billion dollars. Over one-half of that cost is interest and inflation costs. Each year of delay in the installation of a nuclear plant adds more than fifty million dollars to the final cost of the plant.

The Nuclear Regulatory Commission has described its own procedures in the licensing process as "...a serious failure of governmental process to resolve central issues in a timely and coordinated way -- a paradigm of fragmented and uncoordinated government decision making on energy matters and of a system strangling itself and the economy in red tape."

The current nuclear licensing and regulatory process was established by the Atomic Energy Act of 1954, to satisfy requirements of a time when there were very few nuclear plants, and when the technology was in an early stage of development. This basic structure has been only slightly modified during the last twenty-nine years. The U.S. Department of Energy, the Nuclear Regulatory Commission, industry, and many public interest groups recognize that the licensing and regulatory process is outdated and ill-suited for the regulation of a major energy source in a complex and changing economic environment. Although there is a difference of opinion concerning some of the methods necessary to effect reform, most recognize that standardization of power plant designs and early site review are essential elements of any plan.

Early site review would authorize the NRC to approve sites for prospective nuclear plants in advance of a utility's application for a construction permit. The NRC would be authorized to conduct a full hearing to qualify a site as suitable for a nuclear power plant without demonstrating a present need for the plant. Once NRC determined that a particular site was suitable for the construction and operation of a nuclear power plant, the site should be certified for a designated period and a site permit issued.

The development and use of standardized nuclear power designs would benefit public health and safety by concentrating the resources of designers, engineers, and vendors on particular approaches. Standardized designs would also stimulate standardized programs of construction practice and quality assurance, improve the training of personnel, and foster more effective maintenance and improved operations. The use of such designs would permit a more effective and efficient licensing and inspection process.

Recommendation.

A balanced mix of energy sources is essential to the security and the future economic growth of the United States. Nuclear power is an option that can be utilized efficiently and safely and should be a key energy source for the United States.

Because of the problems associated with regulatory delay, no new nuclear power plants are being planned in the United States. To revive the nuclear power option, the Southwest Regional strongly urges the Congress to restructure the nuclear power plant licensing process. The regulatory process should sustain and enhance public health and safety; be predictable, timely, and efficient; encourage investment in nuclear power by being clearly defined; and benefit electricity consumers by reducing construction schedules and costs.

Constructive reform of the nuclear licensing process will benefit everyone. Industry will benefit from the increased certainty and predictability in the licensing process stemming from early site reviews and design standardization, the elimination of duplicative reviews and hearings, and the removal of licensing decisions from the critical path of the nuclear plant cycle; the public will benefit from the more efficient use of its tax dollars in regulatory reviews and the cost savings which flow from the reduced time required to bring plants on line; and that segment of the public participating in the licensing process will benefit from the ability to make its contributions earlier and more effectively.

The Southwest Regional Energy Council urges Congress to authorize an early site approval process which would permit "site banking"; encourage the use of standardized plant design; consolidate the process into a single limited proceeding; eliminate the anti-trust review during the licensing process; and generally limit proceedings to specific factual issues not previously resolved.

INTRODUCTION

The nuclear power plant licensing process is being studied by the 99th Congress to determine whether the regulatory process needs reform, and if so, what kind of reform is appropriate. This subject has become almost a perennial topic in Congress. Hearings on the subject have been held in 1973, 1974, 1975, 1976, 1977, 1978, 1982, and 1983. The consensus that emerges from these hearings is that the nuclear power plant licensing process is clearly in need of reform, however, there is no clear consensus on how to affect that reform.

It is not difficult to understand why a consensus recognizing the need for regulatory reform has been reached. The Nuclear Regulatory Commission has described its own procedures in the licensing process as "...a serious failure of governmental process to resolve central issues in a timely and coordinated way -- a paradigm of fragmented and uncoordinated government decision making on energy matters and of a system strangling itself and the economy in red tape."[1]

Although the consensus recognizing the need for regulatory reform was formed easily enough, a consensus regarding the type of reform necessary has been much more difficult to acheive. This is partly a result of the differing interests and perceptions of disparate groups - utilities, environmentalists, consumers, and regulators - involved in the debates. The political pressure that each group wields has effectively stymied all legislative attempts to affect change in the licensing process.

The foregoing notwithstanding, two concepts have emerged with a broad base of support from a wide range of interest groups. The concepts are early site approval and standardized designs of nuclear power plants.

Early site approval would authorize the NRC to study and permit a particular site as suitable for a nuclear power plant in a proceeding separate and apart from any proceedings regarding need for power or construction and operating permits. With early site approval a location would be qualified as suitable for a nuclear power plant built to design specifications consonant with safety parameters identified in the site approval proceeding. Site permits would be valid for a specified number of years.

Standardized design of nuclear power plants would authorize the NRC to conduct separate proceedings to approve and certify complete designs of nuclear power plants. In licensing a a plant design, the NRC would consider only design safety issues and disregard site specific issues.

With full implementation of early site approval and standardized design, the lead-time required to install a nuclear power plant could be reduced by three to five years.

---

1. Statement of Representative James C. Cleveland (2nd-N.H.) before the Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs, Serial # 95-18, Part IV, page 106. (August 7, 1978)

Through the course of Congressional inquiry into nuclear licensing reform, early site approval and standardized design of power plants have been the subject of hundreds of hours of testimony. The majority of the testificants agree that restructing the licensing process to implement early site approval and standardized designs would significantly improve the licensing process. The major benefits cited in support of this licensing reform are:

- earlier and more effective public participation in the licensing process;
- early and final resolution of site-specific issues prior to the expenditure of significant resources;
- improved construction practices and quality assurance resulting in higher health and safety standards;
- a stable and predictable licensing process;
- more efficient allocation of regulatory resources; and
- reduction of capital and construction costs.

The following pages discuss the benefits of early site review and standardization of power plants and provide the basis of the Council's support for nuclear powerplant standardization and early site approval.

STANDARDIZATION AND EARLY SITE REVIEW OF NUCLEAR POWER PLANTS

A Discussion of Benefits

Actual construction time required for a nuclear plant is about four to six years. With the current regulatory framework in the United States an equivalent period is spent in regulatory proceedings, lengthening the time required for nuclear power plant installation to an average of 10 to 12 years[2]. The cost of building a nuclear plant in the United States is approximately one billion dollars.[3] Over one-half of that cost is interest and inflation costs.[4] Each year of delay in the installation of a nuclear plant adds $40 to $50 million dollars to the final cost of the plant.[5]

To address the problems associated with regulatory delay, the U. S. Department of Energy (DOE) and the U. S. Nuclear Regulatory Commission (NRC) have often urged the Congress to reform the regulatory process for the licensing of nuclear power plants. In support of the Nuclear Licensing and Regulatory Reform Act of 1983 (S.894 - 98th Congress), then Secretary of Energy Hodel testified before the Senate Subcommittee on Energy and the Environment. Secretary Hodel defined the need for licensing and regulatory reform:

> We seek a nuclear regulatory process that will sustain and enhance public health and safety; that is predictable, timely, and efficient; that does not discourage investment in nuclear power by being open-ended; and that does not unjustly burden the electricity consumer by extending construction schedules and costs. We do not now have a process that fulfills these criteria.

The current nuclear licensing and regulatory process was established by the Atomic Energy Act of 1954, to satisfy requirements of a time when there were very few nuclear plants, and when the technology was in an early stage of development. This basic structure has been only slightly modified during the last 29 years. DOE, NRC, industry, and many public interest groups recognize that the licensing and regulatory process is outdated and ill-suited for the regulation of a major energy source in a complex and changing economic environment. Although the DOE and NRC differ on some of the methods necessary to effect reform, both DOE and NRC recognize that standardization of power plant designs and early site review are essential elements of any plan to streamline

---

2. Testimony of A. Philip Bray, V.P. & General Manager, Nuclear Power Systems Division of General Electric Company before the Subcommittee on Nuclear Regulation of Senate Committee on Environment & Public Works. (June 14, 1983)
3. Report on Nuclear Power Plant Delays in New England; New England Federal Regional Council Energy Resource Development Task Force Bulk Power Committee (November 1976).
4. Ibid.
5. Ibid.

the licensing and regulatory process. In hearings on this subject in 1983, the NRC summarized the need for standardized nuclear power plant designs:

> There is a need to encourage the development and use of standardized nuclear power designs because such designs can benefit public health and safety by concentrating the resources of designers, engineers, and vendors on particular approaches, by stimulating standardized programs of construction practice and quality assurance, by improving the training of personnel and by fostering more effective maintenance and improved operations, and because the use of such designs can permit a more effective and efficient licensing and inspection process.

State government officials have also called for nuclear licensing reform. The Chairman of the Washington State Energy Facility Site Evaluation Council, Nicholis Lewis' description of the licensing process is illustrative of the way the process is perceived at the state level: "...(I)n recent years the NRC process has become all too often predictably lengthy, complex, legalistic and in controversial situations, non-decisive."[6]

Senator Simpson's proposal for allowing early site review would authorize the NRC to approve sites for prospective nuclear plants in advance of a utility's application for a construction permit. The bill would authorize the NRC to conduct a full hearing to qualify a site as suitable for a nuclear power plant without demonstrating a present need for the plant. Once NRC determined that a particular site was suitable for the construction and operation of a nuclear power plant, the provisions of the bills require the site to be certified for a designated period and a site permit issued. The bill provides that a site permit would be valid for 10 years and would be renewable for not less than five nor more than 10 years.

The concepts of early site approval and standardized design of nuclear power plants are not new. Legislation to implement early site approval and standardized designs has been introduced in Congress several times. In 1975, the Joint Committee on Atomic Energy considered legislation to reform the nuclear power plant licensing process, including early site approval and standardized design of nuclear power plants. In testimony before the Joint Committee, Commissioner Marcus A. Rowden of the NRC stated:

> Constructive reform of the nuclear licensing process will benefit everyone. The industry will benefit from the increased certainty and predictability in the licensing process stemming from early site reviews and design standardization, the elimination of duplicative reviews and hearings, and the removal of licensing decisions from

---

6. Testimony before the Subcommittee of Nuclear Regulation of the Senate Environment and Public Works Committee (June 14, 1983).

> the critical path of the nuclear plant cycle; the public will benefit from the more efficient use of its tax dollars in regulatory reviews and the cost savings which flow from the reduced time required to bring plants on line; and that segment of the public participating in the licensing process will benefit from the ability to make its contributions earlier and more effectively.

The primary objectives of early site review and standardized design of nuclear plants are: to facilitate earlier and more effective public participation in the facility licensing process; to provide for early decisions on facility siting; and to provide flexibility in the structure of the facility licensing process while assuring the quality and thoroughness of the NRC's safety, common defense and security, and environmental reviews. Separate and early site reviews and decisions should help achieve these objectives by serving to focus public participation on a crucial aspect of the overall facility planning and construction process at an early point in time when public participation can be most effective. The use of standardized facility designs, in addition to offering advantages of design and construction efficiency, can contribute to improvement of protection of the public health and safety by enabling safety-related research and development to be concentrated in fewer areas. It would also place increased responsibility concerning facility design matters on facility component vendors and architect engineers, rather than their customers and clients.

Benefits Attributable to Early Site Review

Senator Simpson's bill would provide legislative authority for the issuance of an early site permit that would be binding on the NRC and would allow a utility or any other party to qualify a site as suitable for a nuclear power plant without demonstrating a present need for the plant. A site permit, issued by NRC, would be valid for 10 years and renewable for a period of not less than five nor more then ten years. Resolution of an issue during the site permit process would not be subject to dispute at a later stage.

The major benefits cited for early site review are:

° earlier and more effective public participation in the licensing process;

° early and final resolution of site-specific issues prior to the expenditure of significant resources; and

° more efficient allocation of regulatory resources.

One purpose of early site review is to increase the opportunity for meaningful and effective public participation in the nuclear power plant licensing process. Public participation in the licensing process would be enhanced by affording the opportunity for hearings on site suitability issues at an early point in time, when relatively smaller commitment to a particular site or sites has been made and a wider range of feasible alternatives may be available.

Current opportunities for public involvement are limited to formal public comment periods, public hearings, written protests, and litigation. These opportunities, by design, involve negative action and adversarial relationships. Moreover, formal access points to the decision-making process usually occur after project plans have been firmly established, environmental studies conducted, and permit applications submitted. By the time the public has an opportunity to become involved under the current NRC licensing process, both the utility and the NRC have already expended considerable time, money, and effort on the project and its licensing. The commitment of significant resources creates a built-in bias to push the project through and complete the licensing. Once a construction permit has been issued and construction commenced, the NRC has never denied an operating license.

By allowing sites to be qualified before significant resources are expended, public concerns regarding the location of nuclear power plants could be addressed without the pressure on the regulators to license a nearly completed power plant. Separate site review would require the resolution of site specific issues prior to construction and prevent the current practice of raising site specific issues during the operating license hearing. After many hundreds of millions of dollars have been spent constructing a plant, the view of small sectors of the public cannot be considered as effectively as it could at the beginning of the licensing process. Early site review would allow public concerns to be addressed before firm decisions have been made by the NRC and the utility. Early public participation would make public influence and expertise more effective in matters related to health and safety. Effective public participation in the site selection process, before significant resources are expended, would spare both consumers and utilities unnecessary expense and costly planning uncertainties.

Separate and early site reviews and decisions would facilitate advance planning to meet energy needs. State governments could take advantage of the site permit process to develop comprehensive energy facility plans.

An economic gain can be realized by society and the utility customers through the utilization of early site approval. Site development costs about ten to twenty million dollars, while the cost twin 1100 MWe nuclear plants is over two billion dollars. By making early, firm decisions regarding site suitability issues, the possibility of delaying plant construction is reduced. In 1977 dollars, a year's delay in the construction of a necessary nuclear facility can cost the rate payers an addition fifty million dollars or more.[7]

Benefits Attributable to Standard Design

By authorizing the NRC to issue binding design approvals in rulemaking proceedings separate and apart from a construction permit application, Senator

---

7. Testimony of John F. O'Leary, Administrator, U.S. Federal Energy Administration, before the Subcommittee on Energy & Environment, House Committee on Interior and Insular Affairs, June 17, 1977.

Simpson's bill would provide several important public benefits. The major benefits cited for certification of standardized designs are:

- repeated use of standard designs would improve construction practices and quality assurance;
- repeated design, construction and manufacturing techniques would permit increased efficient use of high quality engineers;
- certification of a design would free the engineers, architects, and technicians to work on new designs instead of constantly reworking a custom design;
- standardization would make it easier for operating personnel and NRC staff to ensure that the plants are built and operated safely;
- standardization would provide more efficient allocation of regulatory resources and decrease the cost of regulatory review;
- standardization would reduce capital and construction costs; and
- standard designs would provide earlier and more effective public participation.

Under the current licensing procedure, a utility generally obtains a construction permit with less than 20 percent of the plant designed. This procedure has been a major source of backfit requirements because it ignores the common sense principle that the design should be completed and design issues resolved prior to commencing construction. The current system of piecemeal design and regulation often requires changes in the initial design plan after a plant is mostly completed, leading to extensive reworking of other plant systems.

Pre-approval, or certification, of standard designs would enhance the safety of nuclear power plants by enabling designers, constructors, operators, and regulators to concentrate their resources on a smaller number of standardized designs rather than the myriad custom designs that have been the norm. With certified, standard designs, utility management teams would be aware of, and understand what would be required of them by the NRC. Pre-approved standard designs would eliminate reworking of designs or major components after construction has commenced. Management would be able to focus, throughout the life of the project, on quality control and quality assurance needs. By providing a greater depth of experience in a smaller number of basic designs utilities would gain a broader base of generic experience; and the time and resources required for the design, review, certification, and construction of plants would decrease. Estimates of construction and capital costs would be more reliable, enabling utilities to make early, firm decisions which would improve the economics of nuclear power. Consumers would benefit from savings realized by utilities in the form of less expensive electricity.

Standardized designs would enable the regulators to allocate their resources more efficiently to assure the public health and safety because the licensing process would be more predictable if applicants submit standardized designs. Use of standardized plants should obviate the need for lengthy custom reviews of each application, expedite the utility's process of selecting an appropriate plant design, reduce plant construction time, and contribute to improvement of protection of the public health and safety by enabling safety research to be concentrated in fewer areas.

Early site review and standardization of power plant designs can be effective vehicles for the U. S. Environmental Protection Agency (EPA) and its partner State agencies to cooperate with NRC in its licensing responsibilities by providing timely decisions on environmental issues for which EPA and the States have principal responsibility under the Clean Air Act and the Federal Water Pollution Control Act. EPA and the states share the responsibilities, in administering the Federal Water Pollution Control Act, to evaluate environmental impacts upon waters of the United States resulting from the construction and operation of nuclear facilities. In particular, the National Pollutant Discharge Elimination System (NPDES) permit program assures that discharges from industrial facilities will be limited in such a way as to protect the integrity of the Nation's waters. The consideration of environmental effects early in the siting and facility design processes will ensure that delays in construction and operation of the facilities will be minimized.

Under the current system of custom designs, design safety issues are addressed during construction in a piecemeal fashion. This makes it difficult to integrate the related safety issues of different components. Using standard designs, design-safety issues can be resolved during certification and the regulators only have to ensure that the constructors are properly following the design. By allowing the regulators to focus on fewer design-specific problems, they can concentrate on quality assurance and quality control issues during the construction and pre-operation stages.

Finally, standardization would increase the effectiveness of public participation in the licensing process. Persons whose interests are affected would have the opportunity to have their views considered earlier in the process, before any major commitment by the utility to a facility using the design. The current licensing process permits construction of a power plant to commence with as little as 10 to 20 percent of the design complete. This puts a challenger in an extremely disadvantageous position. When a challenger raises an objection, the designer can answer that the objection will be resolved later when that particular component or system is designed. Piecemeal designing makes it difficult to settle the dispute with any kind of certainty. In contrast, during a licensing proceeding for a plant employing a standard design, the public hearing would be more meaningful because the hearing will be held on an essentially complete and final design.

Economic Benefits of Early Site Review and Standardized Designs

With complete implementation of early site approval and standardization, nuclear power plant construction could be reduced to five and a half or six years. This reduction of lead-times for new generating capacity would allow utility commitments to be made closer to the time when new capacity is needed and on more certain load forecasts. In addition, two major elements of cost can be significantly reduced: the cost of interest during construction and allowances for escalation. In combination these two elements may amount to almost half the capital costs of a new generating plant if a ten-year lead time is required.[9] Even more important, a more predictable time-table for licensing will reduce the risk that new capacity may be brought on line before it is required. Either side of this dual risk involves potentially large costs to consumers.

The value of reductions in the leadtimes for installation of nuclear power plants stems in large part from the enormous capital costs associated with construction. According to a 1977 report by the Comptroller General of the United States, each year of delay in the licensing and construction of a nuclear power plant adds about 40 million dollars to the ultimate plant cost.[10] A number of other studies have quantified the costs resulting from regulatory delay in nuclear plant licensing. The following excerpt from DOE testimony presented to Congress clearly illustrates the cost of regulatory delay.[11]

> The current licensing process has expanded over the years so that today, a great deal of time is spent in meeting regulatory requirements. Site selection, environmental review, financial considerations, labor, equipment deliveries, redesign requirements and duplication of efforts are some the areas in which delays can occur.
>
> One example often cited by industry to highlight the problems of the licensing process is the comparison between the Millstone Unit No. 2 and Shoreham. Construction permit applications for both units were filed in 1969. Original construction schedules and cost estimates were comparable for both plants, yet the Millstone Unit went on line in December of 1975 at an estimated cost of $434 million while Shoreham is scheduled for commercial operation in the fall of 1980 at an estimated cost of $1.2 billion. One of the main causes for the differential in time and cost was the length of time between start of hearings and issuance of construction permits. The time

---

[9] The Edison Electric Institute, testimony before the Subcommittee on Energy & Environment, House Committee on Interior and Insular Affairs, Serial #95-18 Part I, pg. 440. (June 1978)

[10] Reducing Nuclear Powerplant Leadtimes: Many Obstacles Remain; Report to the Congress by the Comptroller General of the United States; at page 2; March 2, 1977.

[11] Hearings before Subcommittee on Nuclear Regulation of the Committee on Energy & Environment, Serial # 95-18 Part III, page 809.

> interval between the start of hearings and issuance of construction perimit for Millstone Unit 2 was approximately 3 months; for Shoreham it was approximately 36 months.

Today, in 1985, the Shoreham plant is not yet on line, and the cost has exceeded the estimate for 1980.

CONCLUSION

The Southwest Regional Energy Council would like to emphasize the economic gain to society and to the utility customers of site banks and assured site adequacy as represented by a site permit. Site development runs from ten to twenty million dollars, while the cost of twin 1100 MWe nuclear facilities may run over 2 billion dollars. It certainly seems a good investment to get the siting part of the plant out of the way without running into the possibility later on of delaying the whole plant. Even at a modest rate of inflation, a year's delay of a necessary nuclear facility can end up costing the rate payers an additional fifty million dollars or more, which is several times the cost of the site definition and development.

In order to fairly and adequately define the criteria for the site banks, it is obviously necessary to be able to define a plant that could go on that site and the interaction between that plant, the site and the surrounding environment. In short, what is needed to go along with these site banks are standardized plant designs. By formalizing and finalizing the standardized plant process so such that public hearings and public involvement in the safety and radiological aspects of these standard plants can be discussed fully and completely without getting into other side issues, such as whether the power is needed at a particular site at a particular time.

In light of all the evidence, the Southwest Regional Energy Council respectfully urges this committee to favorably report the Nuclear Powerplant Standardization and Licensing Act of 1985.

TESTIMONY OF

GOVERNOR BRUCE BABBITT

ON S. 16,

"NATIONAL NUCLEAR POWER PLANT PERSONNEL TRAINING ACT OF 1985"

WASHINGTON, D.C.

JUNE 27, 1985

Mr. Chairman, and members of this important committee, I wish to express my appreciation for the opportunity to testify regarding S 16, the "National Nuclear Power Plant Personnel Training Act of 1985," submitted by Sen. Patrick Moynihan.

The period since the accident at Three Mile Island has been a turbulent one for the nuclear power industry in this country. During this shake-out period America has witnessed the scrapping of countless nuclear construction programs. There have been 75 plant cancellations since 1978, including 28 already under construction. The American public has become increasingly sceptical of nuclear power, and concerns about the safety of nuclear power have dominated decisionmaking about the economics and feasibility of this form of electric generation. In short, this watershed transition has taken what elsewhere in the world is a low-cost, reliable, environmentally sound form of energy and transformed it into a power source in this country that is not only high cost and unreliable, but perhaps unsafe in the bargain.

However in the midst of public concern about the industry and the demise of multi billion-dollar construction programs, other developments have been occurring at the level of the plant operators and their training that, while less newsworthy, have been of even greater importance. These human changes in an industry that has historically been hardware oriented, are arguably of even greater significance for the future of the nuclear industry in this country. For as the Kemeny Commission on which I served so clearly concluded back in 1979, poor management was the principal cause of the TMI accident. In the words of the report: "The fundamental problems are people-related problems, and not equipment problems. Except for human failure, the major accident at Three Mile Island would have been a minor accident."

The Kemeny Commission found that inadequate operator training "contributed significantly" to the seriousness of the TMI accident. They also discovered, startlingly, that not only did the TMI training program for operators conform to the NRC standards, but also that the "TMI operator license candidates had higher scores than the national average on NRC licensing examinations."(emphasis added) The Commission found that the NRC had only minimal requirements for operator training, and that an individual could fail critical sections of the NRC exam and still pass the overall examination by getting a passing average score. The NRC had no criteria for the qualifications of those training the operators, there were no formal syllabi or training manuals, and no interface between the training instructors and those who had actually designed the plant. Furthermore, we found that the utility company which had primary responsibility for the training program left content of training programs to the instructors themselves, "who had no greater formal educational qualifications than those of their students." As a result, the commission found, "the training program was quantitatively and qualitatively understaffed as well as conceptually weak."

Pursuant to these findings, we recommended that the NRC establish "agency accredited training institutions for operators and immediate supervisors of operators." Organized on either a national, regional or system-specific basis, we recommended that these programs have highly qualified instructors, and be subject to periodic review and reaccreditation by the NRC. After graduating from such an accredited training institution, which we recommended as a requirement for obtaining an operator's license, the operator would then receive training in operating a specific plant by the utility for which they actually would be working. Finally, we recommended that this training "should not end when operators are given their licenses," but should be comprehensive and continuing, and should always be integrated with operating experience.

The industry itself has not been unresponsive. In fact, nuclear training has become a real growth industry in this country. Between 1983 and 1985 the number of utility trainers had increased by over 50%. The industry was shaken up from top to bottom by TMI, and though the myriad companies had developed their nuclear programs independently, this event forced them to realized that all programs were adversely affected by TMI. (As one senior reactor operator said recently, TMI forced upper management to realize that "you could take a handful of people and almost totally ruin a plant.") The American utility companies therefore formed INPO, the Insitute of Nuclear Power Operations, which accredits training programs for operators and generally acts as a safety advisor for the industry in the field of operator training. However INPO provides no training or instruction, but only serves to accredit the training procedures of its member utilities.

I believe that despite the efforts by the industry to redress this operator training deficiency, a more comprehensive solution which fulfills the spirit of the Kemeny recommendations is called for. Sen. Moynihan, through S 16, has highlighted this continuing inadequacy in operator training in the American nuclear industry. However I feel that charging the NRC to utilize in a programmatic and regularized fashion the tremendous strength and diversity of our educational and training systems in this country would prove a more effective course of action in the long run, and would more faithfully meet the recommendations of the Kemeny Commission. Six years after the national industrial tragedy of TMI, the challenge posed to the policy community in this country is to find creative ways of centralizing and standardizing those components of the nuclear industry that could benefit by such redesign, while preserving the diversified and competitive dimensions of the industry as well.

We need to chart a new course conceptually if we are to break out of the downward spiral in which this important national industry seems to be caught. In this vein, I have recommended that we critique the nuclear power industry using models of other national programs which have had a better track record for success and accountability. Two models which come to mind are Admiral Rickover's nuclear navy and the National Aeronautics and Space Administration. In both cases, a hybrid public/private partnership was put in place, with centralized administration done by a government agency responsible to the Congress and the President, while subcontracting was meted out to the private sector for engineering, construction and procurement. And in both cases, training was overseen at a central location and followed a standardized format.

It is the highly complex and radically unforgiving nature of nuclear technology that compels us to rethink our traditional approaches to issues such as operator training. Centralized and standardized operator training (among other things) distinguishes America's unsuccessful nuclear program from the successes of nuclear power elsewhere around the globe. The time has come for us to question whether the countless local utilities, even if they are now working with a greater degree of cooperation than in the past, can adequately address the complex human and technical challenges of this sophisticated industry. America must ask itself a basic question: why is this industry in a decline in America from which it may never recover, when in virtually every other country in the world it is rapidly becoming the preferred mode of electricity generation? The answers to this question are not easy ones; but they certainly suggest a degree of regularization and training oversight that is still lacking in the American nuclear industry six years after TMI. As I have said before, radical institutional change is a precondition to any future revival of the nuclear industry in this country.

To its credit, S 16 addresses the recommendations of the Kemeny Commission in a forthright way. However I question whether the goals which Kememy recommendations sought to accomplish can be reached by establishing a National Academy. By its own admission, the NRC finds the variety of training programs which it reviews (but does not formally accredit) to be "widely divergent." I would place the onus firmly on the NRC to redress this divergence through statutory changes which would require three things. First, the NRC should set up minimum curriculum standards for any program which trains operators or trains those who will teach operator training courses. While INPO is currently in the process of reviewing such curricula and granting accreditation, I question whether the public scepticism which continues to overshadow the nuclear industry would ever be sufficiently allayed by an industry-sanctioned and operated curriculum review and accreditation process. Further, the challenge to the NRC is to focus on curriculum development in such a way that the training curriculum for a given plant deal not only with mechanical issues of plant operation, but also address the entire nuclear energy process from a more global and comprehensive perspective. What TMI taught us was that our operators, while possessed of an inadequate degree of technical competence, had even less appreciation of the systemic dimension of nuclear technology. It was such an holistic perspective that was lacking among the TMI operators, which in turn prevented them from thinking themselves out of a micro-level mechanical dilemma, and then perversely inclined them to an overreaction which caused billion dollar damage. It is only when the American public can be assured that such minimum curriculum standards are in place that they will come to accept the reasonableness of granting operators licenses to people with a high school education and two years of power plant experience.

Secondly, the NRC must be granted authority to accredit the institutions which train operators. While they presently review such institutional programs, a more stringent regulatory oversight must be exercised. The NRC must get into the business of actually granting accreditation to such training programs, and until it does the public will be less than comfortable with the fractionated and independent programs and curricula in use to train operators, despite the best efforts of INPO. (The accreditation process obviously presumes that minimum curriculum standards would already be governing operator training programs.)

Thirdly, the NRC must be given the mandate to monitor and audit the training and the programs across the country. We must move from a place where training programs are recognized as divergent to a status where training programs in place in a diversified industry meet minimum curriculum standards, are taught at accredited schools which the public can have confidence in, and are regularly monitored by the regulatory body.

In closing, while I applaud Sen. Moynihan for the efforts which S 16 makes to fulfill the recommendations of the Kemeny Commission, I would suggest that granting statuatory authority to the NRC to redress the admitted inadequacies in operator training will be both more effective and more conducive to public support than will the establishment of a national academy for such training.

Statement
of
American Public Power Association
Submitted to the
Senate Environment and Public Works Committee
Nuclear Regulation Subcommittee
on
Nuclear Power Plant Siting and Licensing Reform
July 19, 1985

The American Public Power Association, the national service organization representing more than 1,750 local publicly owned electric utilities throughout the United States, supports nuclear power plant licensing and regulatory reform.

APPA members are interested in nuclear power because (a) some of them own and operate nuclear power plants; (b) a number are joint owners of nuclear power plants built and operated or planned by other utilities; (c)others have executed life-of-unit agreements for capacity in nuclear power plants; and (d) many purchase power at wholesale from utilities which use nuclear power plants for part of their generation.

Total nuclear generating capacity on-line or proposed by public power local and state agencies in 1984 was in excess of 13 million kilowatts. When the on-line and underway plants of the Tennessee Valley Authority (which serves 110 municipal electric utilities) are added, the figure is nearly 24.2 million kilowatts.

APPA backs bills which would streamline the licensing process for nuclear power plants through standardized plant designs, early site reviews, and the issuance of a combined construction permit and operating license. Legislation which will provide for a more effiecent and effective licensing climate consistent with public health and safety deserves the immediate attention and action of Congress.

How much electric generating capacity will be needed to meet future demand is a topic of considerable debate. While the load growth rate has slowed, the use of electricity continues to expand. Oil and gas supplies may not be adequate to meet future damand. Coal is a possibility, but concerns over the environmental impact of fossil fuel combustion are receiving increased attention. Additional nuclear facilities may be required in order to satisfy both national energy and environmental protection objectives. Licensing reform legislation is not only desirable but necessary if the nuclear option is to be preserved.

What are the consequences of shortening the time it takes to bring a nuclear power plant on line?

- Utilities would be encouraged to utilize nuclear power if they thought their exposure prior to power production could be reduced to less than a decade.

- Cost of building plants would be reduced.

- Decreased uncertainty and increased confidence about nuclear power would reduce pressure on development of coal resources, and permit a further fallback from reliance on oil and natural gas for power production.

- Economic benefits would flow to consumers of those regions which now would otherwise rely on more costly sources of electricity.

A consensus appears to be developing among the several bills that have been introduced in Congress. The three current proposals, Nuclear Powerplant Licensing and Standardization Act of 1985 (H.R. 1447 and S. 836) proposed by the Nuclear Regulatory Commission; the Nuclear Powerplant Standardization Act (H.R. 1029), introduced in the House by Congressman James T. Broyhill (R-NC) and the Nuclear Facility Standardization Act of 1985 (H.R. 2488) proposed by the Department of Energy, address the same three issues:

- approval of standard powerplant designs;

- early site approval;

- issuance of combined construction and operating licenses.

All of these elements would provide for essential regulatory scrutiny but avoid unreasonably prolonged procedures which cause unnecessary costs. Adoption of these licensing improvements would give ample opportunities for public participation and place emphasis on the substance of issues rather than on the process.

APPA would like to comment on several specific items which will be included in the licensing reform debate.

Early Site Approval

The bill under consideration by the Nuclear Regulation subcommittee, S. 836, would allow "any person or entity" to secure a nuclear power plant site permit good for a period of ten years. Renewal of a site permit would be for a period of not less than 5 years or more than an additional 10 years from the date of renewal. APPA supports the site permit renewal language of S. 836 and opposes indefinite renewal of a site permit.

There are a limited number of new sites for nuclear power plants mainly because of requirements necessary for such sites. For instance, large amounts of land are required plus access to significant volumes of cooling water. In addition, these sites must be served by major transportation facilities for movement of massive components; have low population density; require geologic stability; and have adequate opportunity for heat dissipation, transmission access and acceptable community impact.

The whole location must result in an econmic and technically feasible plant, and pass the regulatory scrutiny of NRC and affected staes.

Not every locale is suitable for a nuclear power plant. Some states and regions may be hard-pressed to find futue sites which meet the requirements. Where sites do exist, industrial organizations also seek to use them.

Because sites are a scarce commodity with a potentially high value, there could be attempts to monopolize or control them in restraint of trade. This is a fact of particular importance because sites for nuclar power plants (or other kinds of generating facilities which might be built there) will be employed to produce an essential public service -- electricity.

There exists the possibility of multiple applicants for a single site, and a need to consider what requirements and restrictions should be placed on a successful appplicant in order to insure that others with an interest in nuclear power are treated fairly in competitive terms. It is theoretically possible that a single entity -- such as a big electric utility holding company -- whose application was first in time, might corner the market on sites, hang onto those rights, and bargain them away over a 20-year period or establish monopoly power over an important energy-related resource.

While this occurrence may be considered unlikely, what is quite plausible is the creation of regional site fiefdoms in the hands of a small group composed of the larger utilities. The reson that this scenario seems realistic is that it echoes past patterns of conduct where similar consortia conspired to control access to nuclear generation to the detriment of smaller systems.

Antitrust Review

The foregoing problem was solved, in part, by application of the anticipatory anti-trust review provisions of Section 105(c) of the Atomic Energy Act. The NRC bill needs to provide the same protection in connection with early site approval by including in Title III, Section 301, a site permit as a subject of review. The words "a site permit and an application for a license to construct, operate, or construct and operate" should be included.

APPA strongly supports this antitrust review at the site permit stage and supports continuation of the existing statutory and administrative procedure for dealing with these matters, the pattern for which is well developed and accepted. Only H.R. 1029, introduced by Congressman Broyhill, contains the appopriate language.

Application Review

Another point which APPA would like to bring to the attention of the Subcommittee for its consideration is a point of special interest to APPA members. In the case of publicly owned electric utilties, which are governed by a city council or an elected or appointed board of public officials, a determination on "need for power" and the source to satisfy it are made by those having responsibility for setting the policies of the systems. In some situations, affirmation of that decision by a political subdivision of the state may be required by a state agency with responsibility for approval of siting of bulk power supply facilities.

Many proposed nuclear power plants are planned to meet the needs of consumers in more than one state. Frequently, such facilities are part of a regional power supply program involving interstate movement of power on a coordinated basis. The reasons for these kinds of arrangements include these facts:

- There are economies of scale in building nuclear power plants, and an individual utility may be unable to maximize the potential savings because its load is not large enough.

- Because of geographic proximity, corporate ties, or power pool patterns, it may be most logical to share plant output with a utility or utilities in another state rather than put together an agreement with power systems in the same state.

- All states do not have the same availabilty of land and water required for a nuclear power plant, and it may be mandatory to build the facility in one state and tranmsit the power to another state which seeks to use this source of energy.

There is no present requirement that regional planning by utilities be taken into account in local and state decisions on the need for power. A single state can veto construction of a particular nuclear station on grounds that there is not a need for power within the state even though output of the plant would be fully absorbed on a regional basis. The result of such a veto could be to deny use of nuclear power not only in the state where approval is sought, but throughout the region involved.

In consideration of nuclear regulatory reform legislation, APPA recommends that when a nuclear power plant is a regional project, in that it would serve the needs of more than one state, then NRC should have authority to make the necessary evaluation and determination of the need for such a facility in consultation with the affected states.

AMERICAN TECHNICAL INSTITUTE
MEMPHIS, TENNESSEE

July 8, 1985

Senator Alan K. Simpson, Chairman
Nuclear Regulation Subcommittee
Committee on Environment and Public Works
U. S. Senate, SD-412
Washington, DC 20510

Dear Senator Simpson: Re: Senate Bill S. 16

Please enter the enclosed statement for the record in regard to the hearing held June 27, 1985, on Senate Bill S. 16 entitled the "National Nuclear Powerplant Personnel Training Act of 1985".

This statement is offered on behalf of the American Technical Institute, its faculty and the industries supporting the Institute. After nearly three years in the planning stage, the American Technical Institute was established in January, 1985. The Institute provides the same resources that the federal academy proposed in S. 16 would provide without requiring financial support from either federal or state government. Senate Bill S. 16 would, if passed, spend federal tax revenue to duplicate an already existing resource and seriously jepordize the Institute's future.

Please contact me at the above address or at (901) 756-0706 if additional information is needed.

Best Regards,

D. W. Jones
President

Enclosure

P.O. BOX 241934 · MEMPHIS, TENNESSEE 38124-1934

STATEMENT

D. W. Jones, Ph.D.
AMERICAN TECHNICAL INSTITUTE
Memphis, Tennessee

On behalf of the American Technical Institute, its faculty and supporting industries, I respectively request that further consideration of S. 16, the "National Nuclear Powerplant Personnel Training Act of 1985" be postponed. The basis for this request is that an alternative institution, which provides the same resources and services as those cited by S. 16, is already in operation. The operating Institute does not require financial support from either federal or state government and is rapidly gaining acceptance by the nuclear industry. Passage of S. 16 would seriously jepordize the future of the American Technical Institute and require expenditure of federal tax revenue to duplicate an already existing and equivalent resource.

I. THE AMERICAN TECHNICAL INSTITUTE

1. The purpose for which the American Technical Institute was established is to provide job-related, academic training and a degree program for nuclear facility personnel.

2. After being in the planning stage for three years, the American Technical Institute was organized in January, 1985, formerly chartered in March, 1985, as a not-for-profit educational institution and began operation in May, 1985.

3. The American Technical Institute delivers its courses and degree programs at nuclear plant sites and takes advantage of the extensive facilities and plant specific training aids available at these sites for training nuclear plant operators and technicians.

4. As a non-profit educational institution, the Institute is governed by a Board of Directors comprised of senior executives from the nuclear industry and members with experience as academic faculty and administrators of major universitites.

5. The American Technical Institute has applied for membership in the Southern Association of Colleges and Schools, the regional association responsible for accreditation of educational institutions. The Institute is preparing an application for accreditation of its programs for submission to the Accreditation Board for Engineering and Technology.

6. The American Technical Institute does not require financial assistance from federal or state government. It is funded by the industry for which its programs are provided.

7. The American Technical Institute established an academic degree program for nuclear power plant operators and will establish degree programs and certification programs for personnel in other job descriptions as directed by its Board. To assist in the development of

curricula for these positions, a standing committee has been established to advise administrators on matters related to course content and qualification standards. All curricula are job-related and based upon job and task analysis of positions for which the training is intended.

8. Programs of the Institute will encompass requirements of the Nuclear Regulatory Commission for operators as well as other recommendations from the Institute of Nuclear Power Operations.

9. The activities of the American Technical Institute encompass all those activities proposed under S. 16, especially as set forth in sections 102, 203, 206 and 207.

10. The American Technical Institute will offer its services to all utilities operating nuclear power plants, which may at their discretion contract for training services to be delivered at their plant site.

11. The American Technical Institute will also offer its programs on a centrally located campus in Memphis. Tennessee, where students may prepare for employment and careers in the nuclear industry. The central campus will be operated in addition to and as a supplement to programs delivered at the plant site.

12. The administrators and faculty of the American Technical Institute have more than a decade of experience in delivery of academic education at plant sites for nuclear facility personnel and programs developed by this faculty and staff will draw upon the collective experience and knowledge of the Institute and its advisory committees.

II. Advantages of the American Technical Institute over a Federal Academy

1. The American Technical Institute is a private initiative that answers a public need for assurance of safety and reliability of nuclear plant operation.

2. The American Technical Institute takes advantage of plant site facilities and training aids which are plant specific and directly support preparation of personnel to work in the power plant. It is believed that these resourses are better suited to training and education of operators than would be generic facilities located on the main campus of an academy, and the plant site facilities are available without cost to the Institute.

3. The American Technical Institute does not require federal or state support, but Senate Bill S. 16 would expend federal tax revenue to duplicate an existing resource.

4. By offering its courses and program at plant sites, the American Technical Institute will create an opportunity for all experienced operators at the plant site to receive training. Job and family responsibilities would prohibit most of the experienced operators from attending the main campus of an academy with the eventual result that these personnel and their experience would be lost from the operations force.

5. By offering its programs at the plant site, the American Technical Institute will permit utilities to effectively combine work of experienced personnel in the plant and classroom work. Requiring experienced operators to attend the central campus of an academy will result in an ineffective utilization of the experienced workforce.

6. Delivery of programs at the plant site will strengthen the educational background of all the experienced operators and create opportunity for their advancement within the utility. The result would be retention of experience in the utility and an increase of operational experience in the management staff. Requiring experienced operators to attend the main campus of an academy would effectively deny them the opportunity to comlpete for higher positions in their company and contribute to eventual loss of experienced operators and a lower level of operational experience in the management staff.

7. Offering programs at the plant site will allow utilities to build a resource of personnel with job-related educational backgrounds at its plant site from which future operators may be recruited. Cooperative programs between the American Technical Institute and local two- and four-year colleges would increase this resource. A federal academy would provide only a single resource of personnel from which operators could be recruited.

8. No law requires gradution from the Institute as a prerequisite for license or certification as proposed by S. 16 for a federal academy; but a greater population of experienced operators would participate in programs offered by the American Technical Institute at plant sites than would participate in an academy with one campus.

9. The American Technical Institute also provides a central campus where students may prepare for future employment and careers in the nuclear industry as would the federal academy proposed in Senate Bill S. 16. This will provide an additional resource from which utilities may, in the future, recruit new employees with a job-related educational background.

LET'S REBUILD, AMERICA
IN THE 80's

Statement of the Chamber of Commerce of the United States

ON: THE NEED FOR ENACTMENT OF NUCLEAR POWER PLANT LICENSING AND STANDARDIZATION LEGISLATION

TO: SUBCOMMITTEE ON NUCLEAR REGULATION OF THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

BY: SUSAN L. CONNOLLY

DATE: AUGUST 8, 1985

The Chamber of Commerce of the United States is the world's largest federation of companies and associations and is the principal spokesman for the American business community. It represents more than 180,000 companies plus several thousand other organizations such as local/state chambers of commerce and trade/professional associations.

More than 90 percent of the Chamber's members are small business firms with fewer than 100 employees, 53 percent with fewer than 10 employees. Yet, virtually all of the nation's largest companies are also active members. We are particularly cognizant of the problems of smaller businesses, as well as issues facing the business community at large.

Besides representing a cross section of the American business community in terms of number of employees, the Chamber represents a wide management spectrum by type of business and location. Each major classification of American business--manufacturing, retailing, services, construction, wholesaling, and finance--numbers more than 14,000 members. Yet no one group constitutes as much as 29 percent of the total membership. Further, the Chamber has substantial membership in all 50 states.

The Chamber's international reach is substantial as well. It believes that global interdependence provides an opportunity, not a threat. In addition to the 53 American Chambers of Commerce Abroad, an increasing number of members are engaged in the export and import of both goods and services and have ongoing investment activities. The Chamber favors strengthened international competitiveness and opposes artificial U.S. and foreign barriers to international business.

Positions on national issues are developed by a cross section of its members serving on committees, subcommittees and task forces. Currently, some 1,800 business people participate in this process.

STATEMENT
on
THE NEED FOR ENACTMENT OF NUCLEAR POWER PLANT LICENSING AND STANDARDIZATION LEGISLATION
for submission to the
SUBCOMMITTEE ON NUCLEAR REGULATION
of the
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
by
Susan L. Connolly*
August 8, 1985

The U.S. Chamber of Commerce is pleased to have the opportunity to comment as the Committee considers proposals on nuclear licensing and regulatory reform.

While forecasts differ in their quantitative aspects, most energy experts predict that the country's continued health and growth will require additional electrical generating capacity, in addition to improving energy conservation and efficiency. Significant additional capacity may be needed in some regions. Realistically, coal and uranium represent the only two fuels available to meet the bulk of our future electrical needs.

Over the more than twenty-five years of experience of the private sector in designing, building and operating nuclear plants, a broad consensus has formed that the Nuclear Regulatory Commission's (NRC) regulatory requirements have been unstable and unpredictable and have contributed substantially to utility managers' recent decisions essentially not to use this important energy source.

---

*Manager, Energy and Natural Resources Policy

More than 100 nuclear power plants have been cancelled since 1972. In 1984, nine reactors worth more than $10 billion, on which substantial work had been completed, were abandoned. There are many reasons for these cancellations and for the lack of orders for new plants since 1978. However, a compelling reason, one which is the subject of this statement, is the antiquated framework under which the NRC regulates the nuclear industry.

We have opportunities to modernize this framework to reflect current informed engineering consensus and to learn from experiences in other countries. Our doing so will help preserve the nuclear option. Modernization and even substantial changes in present licensing and regulatory processes can be consistent with high-level safety standards. Change does not mean that nuclear power is to be chosen above all others but rather that it be given a fair chance when a choice must be made.

In order to accomplish all of this, we urge this Subcommittee and the Environment and Public Works Committee to report nuclear power plant licensing and standardization legislation based on the following principles:

(1) pre-approval of standardized plant designs;
(2) early site approval;
(3) a combined construction and operating license; and
(4) regulatory stability.

THE NEED FOR REFORM

During the past two years, electricity demand has increased nine percent, a larger increase than at any time since the 1973 Arab oil embargo. Some high-growth forecasters predict that a shortage of electricity is possible in the near future, with demand beginning to exhaust supplies between 1988 and 1990. They predict increasing electricity prices beginning around 1990 and limited and/or restricted electricity supplies hindering economic development shortly thereafter. Other forecasters predict this scenario five to fifteen years later, but five to twenty years is a short period when it takes fifteen or so years to plan, site and build any kind of plant. The Chamber has no basis to choose one growth forecast over another. Nonetheless, the implications of these forecasts are troublesome. Not only does bringing a new plant on-line require a long time, but also under the present nuclear power plant licensing framework no new plants have been ordered since 1978; all those ordered since 1974, with the exception of two, have been cancelled; and many other plans for new plants have been shelved. Equally troublesome is that the time required to build and license a nuclear power plant is double that of a decade ago and more than double that for plants built in France, Canada, West Germany and Japan. Ironically, some of the plants overseas use U.S. developed and licensed technology.

The laws governing the regulation and licensing of nuclear power plants have not been comprehensively modernized since they were enacted in 1954. At that time the commercial nuclear power industry was just beginning, and reactor designs were still untested. Because of this, Congress enacted the present two-step licensing process under which utilities must obtain NRC approval both to site and construct a plant and then to operate it. While perhaps appropriate in 1954, this process has caused many utilities serious problems because it postpones safety decisions until construction is nearly finished. Utilities have often been required substantially to modify plants after they were built or installed, sometimes without any systematic analysis of cost effectiveness or impact on overall safety.

Such last-minute modifications increase the time required to construct and license plants and escalate their cost to the utilities and their ratepayers. At many plants, the cost of these modifications has exceeded the original cost of the plant, leading to decisions to retire some plants rather than complete them. The overall effect is that the siting and licensing process has caused industry and the NRC to be diverted from important safety-related activities, created an uncertain and unstable regulatory environment, failed to maximize the effectiveness of the essential public participation in nuclear decisions, and imposed new or modified safety requirements without any systematic analysis of cost effectiveness or effects on overall safety.

The Chamber's concern with the current archaic and ineffective method of licensing is that it raises the cost of electric power. The result is a lowering of the economic efficiency of public and private-sector enterprises with the subsequent loss of competitiveness to overseas producers. As a result, everybody in the country suffers, particularly those with low incomes or those who may lose their jobs because their employer can no longer compete. The industrial expansion that made this country great was facilitated by the ready availability of ample supplies of economic electric power. Reform of nuclear licensing is necessary to remove an obvious roadblock to continuing such supplies.

PRINCIPLES OF NUCLEAR POWER PLANT LICENSING AND STANDARDIZATION LEGISLATION AND BENEFITS OF NUCLEAR REFORM

In order that electricity consumers can be assured predictable and economic supplies, the Chamber urges the Committee to report legislation to reduce effectively the lead time to site and license a new nuclear plant, without compromising public health and safety and proper public participation, and to provide regulatory stability for plants both during construction and once during operation. We recommend the reform be structured around the following four principles:

(1) Certified Standard Designs. The NRC should certify standard plant and sub-unit designs. The certification(s) should be valid for a set period, renewable as appropriate, and modified only when the Commission concludes a design is unsafe or no longer

warranted, after weighing costs and benefits. A goal is type certification for a reactor and its associated equipment, a safety assurance method used in many other industries.

Standardized plant designs would reduce the cost and time required to bring nuclear power plants on line, thus reducing construction costs. Standardized designs would promote safety by concentrating the resources of design engineers and vendors on improved designs and standardized programs of construction practices and quality assurance. Pre-approval of designs would also enable safety reviews to be substantially complete before construction begins.

Importantly, standardized designs would facilitate the sharing of construction experience within the industry, which will, in turn, contribute to safety.

(2) Early Site Approval. The NRC should approve a site before an application to build and operate a nuclear plant is filed. The site approval should be valid for a set period and renewable for an additional period. Standards and criteria necessary to approve a site should remain matters of NRC discretion and expertise.

Early site approval would allow an applicant to obtain NRC approval of sites without committing to build a particular facility by a set date. It would effectively "bank" a few sites and thus enhance regulatory stability and a utility's ability to obtain NRC permission to begin construction later because the siting decisions would be separated from need and design decisions.

(3) Combined Construction Permit and Operating License. Especially with type certification, the NRC could issue a combined construction permit and operating license (of course, only if an applicant demonstrates competence and subject to public hearings). Following the completion of construction, the public should be given an opportunity to request an additional hearing, limited to safety issues that could not have been raised previously. The NRC should not be required to consider or reconsider factual issues which have been resolved in other Commission proceedings.

A combined construction permit and operating license would assure that all significant safety issues are resolved prior to beginning construction and major financial commitments are made. Moreover, it would provide for earlier public participation in the nuclear licensing process than under the current process.

(4) Regulatory Stability. Criteria should be set forth to govern all additions, deletions and modifications to initial NRC requirements, based on a systematic and documented review of the benefits and costs associated with proposed changes.

A systematic, disciplined review of retrofit requirements would enhance the project's overall safety and provide regulatory stability.

CONCLUSION

The present licensing and regulatory process satisfies no one. Industry's and the NRC's resources are being diverted from important safety-related work. The licensing process fails to maximize the effectiveness of public participation. Regulatory uncertainty is causing utilities not to choose nuclear power as a source of new generating capacity. The public and the national economy suffer.

We believe that a restructuring of the NRC licensing process is overdue and urgently needed. The reform measures outlined above, taken as a whole, would contribute greatly to helping preserve nuclear power as a realistic option to help meet our nation's electricity needs. We urge the Committee to report licensing and standardization legislation based on these principles.

TESTIMONY OF
R. JAMES ANSELL
BEFORE THE
SUBCOMMITTEE ON NUCLEAR REGULATION
OF
THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
U. S. SENATE

Reference: National Nuclear Power Plant Personnel Training Act of 1985 (S.16)

PowerSafety International, Inc. is an organization engaged exclusively in the training of power generating station operations, maintenance and support personnel. The PowerSafety organization was formed by two parent companies (The Babcock & Wilcox Company with over 115 years experience in the steam generation industry, and FlightSafety International, a premier trainer in the business and general aviation industry worldwide) to meet the industry needs for high standard, performance-based training programs. Training programs are presently available for many skill areas in both the fossil and nuclear power industry. PowerSafety is extremely proud of the programs available for initial and recurrent training of nuclear reactor operators, senior reactor operators, shift supervisors, shift technical advisors, and operations engineers.

PowerSafety concurs with the intent of the National Nuclear Power Plant Personnel Training Act of 1985, which is to assure the availability of appropriately trained personnel and improve the overall training process. We do not, however, believe that a federal academy would contribute significantly to meeting the stated goals of this bill and are opposed to the formation of such an academy. Instead, a federal academy and the additional associated regulations would dilute the existing efforts of the individual utilities, the Institute of Nuclear Power Operations (INPO), the Nuclear Regulatory Commission and training contractors such as PowerSafety, who are striving for excellence in their training programs.

As with all endeavors, the training of operations personnel could be improved by more and better instructors and facilities, together with additional information on plant-specificity. However, it should be recognized that the current generation of reactor operations personnel are trained professionals able to deal with both the routine and the unusual operational transients that occur in their everyday work environment. These professionals have developed their skills through many combinations of academic, military, utility sponsored, and on-the-job training programs. By formally accrediting and periodically reviewing the programs implemented by individual utilities to best meet their training responsibilities, INPO, the accreditation board, and the individual utilities are building a strong foundation for present and future training programs.

PowerSafety International believes that the utility/INPO/NRC programs are effective and there is no demonstrated need for a federal academy. PowerSafety further feels that the federal government should regulate rather than displace legitimate, commercial training interests. A federal academy - even one operated on a contract basis by commercial interests - also restricts private enterprise by barring entry to this specific market served by such a federal academy until the opportunity for contract renewal occurs.

It is in the nuclear industry's and the federal government's best interest to continue to support the programs already in place.

The following letters respond to a request from Senator Moynihan for views on S. 16, The National Nuclear Powerplant Personnel Training Act of 1985.

The University of Arizona

College of Engineering and Mines
Department of Nuclear and Energy Engineering
Tucson, Arizona 85721

1885
1985
A Proud Beginning

July 2, 1985

Daniel P. Moynihan
United States Senate
Washington, DC 20510

Dear Senator Moynihan:

I am responding to your invitation of May 6 to comment on the National Nuclear Power Plant Personnel Training Act of 1985 (S. 16). I appreciate the invitation since my interest is a long-standing one arising from my responsibility over the years for the operation of research reactors, including the training of personnel. My interests in the training of personnel for commercial power plants was heightened in the summer of 1979 when I was asked to serve as a consultant for the Technical Staff of the President's Commission on the Accident at Three Mile Island (The Kemeny Commission). Since then I have participated in several studies which focused on the lessons to be learned from that accident including the design of effective training programs for power reactor personnel.

As I examine the diverse range of issues facing our society, I am struck by the growing evidence that argues for the strength to be derived from diversity. This lesson is remarkably pervasive and includes not only the strong counsel that we rely on a diverse range of energy resources, but also the interesting suggestion that the personnel involved in the operation of nuclear power plants should have diverse backgrounds for their training.

Thus when it was originally suggested by members of the NRC staff in SECY 81-84, as I recall, that all nuclear power plant operators be required to possess formal academic degrees, I demurred. At the same time, my reading of the lesson of TMI-2 is that to a degree the problem might have been influenced by the fact that all of the crew on duty at 4:00 a.m. on March 28, 1979, were experienced graduates of the Naval Nuclear Reactor Operators Training Program, and in a very real sense their collective skills were no greater than the skills of any one individual. In brief, it would appear that the proper mix for an operating crew is some of both; the individuals with sharply focused plant-specific training reminiscent of the Navy program leavened by the presence of competent, more broadly educated engineering graduates who have been sensitized to the interpretation of the unexpected and who are skeptical of the pat answer.

It was to assure this latter ingredient that the NRC thinking eventually evolved to the requirement for the Shift Technical Advisor or an equivalent position. It was in the failure to provide such personnel in an operating crew prior to TMI-2 that many utilities unwittingly left out a very important ingredient in any Naval Reactor Program operation. Specifically, they left out a counterpart to the trained officers who are always present and on call in the operation of any Naval Reactor.

I have included these remarks in the hope that they will convey to you both my deep concern for the issue and an appreciation that I have thought about the problem. It is because of both my concerns and perspective that I have serious reservations about the appropriateness of S. 16. First and foremost among my concerns is the implied intent to make everybody look alike. At this point my intuition says that is wrong.

But, more specifically, I believe that the task oriented training programs developed under the auspices of the Institute of Nuclear Power Operations are the proper approach for training the majority of reactor and support system operators. These programs are plant-specific and focus on the specific tasks expected of the operator and include repeated demonstration of complete familiarity with the particular power plant in question. These programs have the added advantage that as changes are made or as retraining and review is scheduled, the participants start from a clear and common base. The other portion of the staff should be individuals with appropriate academic backgrounds (usually in nuclear or mechanical engineering) supplemented by additional general safety oriented training and plant-specific details. We have arrived at this mix in the typical ad hoc trial and error method that seems to characterize a lot of the things we do. I would submit, however, that convergence has been remarkably rapid.

I have one final thought to share with you. As a Professor in Nuclear Engineering, I continually ask myself to evaluate the likely performance of students once they graduate and face real world pressures. I am quite willing to acknowledge that my recommendations in response to inquiries from prospective employers in many cases will differentiate between a given student's likely performance in an operations job versus performance in an analysis job. Not all people are equally suited to do all jobs. I seriously question the wisdom of selecting a person as a likely operator and then investing the money, time and build up the pressure of the resulting institutional expectations that result so long in advance of the real on-the-job evaluation of the individual. It is highly preferable that the person's general educational background be such that other positions are available for those whose performance as operators does not come up to expectations.

I recognize that my response is long--indeed much too long. However, I do not believe that S. 16 is a good idea and I have very specific reasons for this. Most importantly, I think we do need a certain degree of diversity among the technical staff in reactor operations and I believe S. 16, if anything, is contrary to this concept. I look forward to learning more of the real progress in this area and can assure you that I share the goal of achieving greater competence in the operation of the nation's civilian nuclear power plants.

Very truly yours,

Robert L Seale

Robert L. Seale
Professor and Head
Department of Nuclear and
Energy Engineering

HOWARD UNIVERSITY
WASHINGTON, D.C. 20059

DEPARTMENT OF MECHANICAL
ENGINEERING
NUCLEAR ENGINEERING PROGRAM

June 13, 1985

Mr. Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

Dear Mr. Moynihan:

I received your 6 May 1985 letter on 31 May 1985. You have requested my comments on the National Nuclear Power Plant Personnel Training Act of 1985 (S.16).

Generally, I am of the opinion that goals you have outlined for the establishment of a National Academy for Nuclear Power Safety are laudable in that they are designed to upgrade and improve training for civilian personnel who operate nuclear power plants. Because it is unclear how the proposed Academy program would offer to a variety of plant personnel "a basic course of instruction in nuclear power operations, as well as onsite instruction at nuclear plants to deal with the unique aspects of operating individual reactors" (emphasis added), further comment is not possible. The establishment of such an Academy should not be allowed to unfocus the ultimate personnel training responsibilities of utility owners of such plants. There are fundamental differences in programs designed for civilian personnel and those for military (Navy) personnel. These differences should not be overlooked.

Thank you for your request, I hope these brief comments are helpful to you.

I remain,

Sincerely yours,

George A. Ferguson

George A. Ferguson, Ph.D., Director
Nuclear Engineering Program

University of Illinois
at Urbana-Champaign

Fusion Studies Laboratory
214 Nuclear Engineering
Laboratory
103 South Goodwin Avenue
Urbana
Illinois 61801

Nuclear Engineering Program
217 333-3772

June 7, 1985

Senator Daniel Patrick Moynihan
United States Senate
Washington, DC 20510

Dear Senator Moynihan:

Thank you for your letter asking for comments about the National Nuclear Power Plant Training Act of 1985. I would like to commend you on your deep concern and action in this area. The concept of a national academy has merit but it also introduces some problems. Should it go forward, I would like to see the nuclear engineering departments at our univerities involved, since we have the real charge for developing the educational base in this area. Perhaps the students could take basic courses at various universities after which they would go to the academy for specialized practical training. In doing this, care must also be taken not to detract from the training facilities at utilities. As you well know, education is a lifelong task and once a student graduates from the academy, he should continue to receive refresher courses and specialized training. These activities can be best carried out by the utilities themselves, so we don't want the academy to undermind their feeling of responsibility for training.

I hope these comments will be of help to you. Let me wish you the best of luck in your continued effort to make constructive contributions to the nuclear power industry. I feel that this is essential for the long term future of America.

Sincerely,

George H Miley

George H. Miley, Director
Fusion Studies Laboratory

IOWA STATE
UNIVERSITY

Department of Nuclear Engineering
261 Sweeney Hall
Ames, Iowa 50011

Telephone 515-294-5840

May 29, 1985

Senator Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

Thank you for giving me an early opportunity to review your proposal to establish a National Academy for Nuclear Power Safety. Although I am responding quickly, this is because the bill is --mercifully -- short and easy to understand; I've read it several times before putting pen to paper.

On first reading, I noted one statement that roused my hackles, and it continues to do so. This is not in the bill, but in your introductory remarks. What we learned at Three Mile Island was certainly not that a nuclear power plant can put a whole state at risk; the allegation was and remains false. Rather, we learned that, given a media buildup, people can be made to believe such a statement. This realization is what convinces me that your proposal is necessary. Only when the people in charge of nuclear operations are trained and personally licensed by a legitimate public agency will people be willing to trust these operations in the face of irresponsible, fear-mongering accusations.

I would also wish that less fetishism be expended on Admiral Hyman Rickover. Some of the naval reactors training for which he is responsible is inappropriate and counter to safe practice in a civilian plant.

Yet, I am only caviling at remarks. The bill itself has my endorsement. The detailed comments that are attached should be taken only as a political amateur's attempt to fine-tune a good idea.

Sincerely yours,

Bernard I. Spinrad

Bernard I. Spinrad
Professor and Chair

Comments on S.16

Section 101 In item (4), some analogies to "accepted professional training practices" for other industries might be desirable to indicate what precedents should be followed. The mine safety academy mentioned in your remarks comes to my mind.

Section 102 and elsewhere I suppose that the NRC's "regulatory guidance" must be alluded to, but I find the wording intolerable just the same. If something is a regulation, it's more than guidance. Pity, there's no gobbledygook reduction act on the books!

Section 202(a) Should the Superintendent report to the Commission or to the Commissioners? I am haunted by the thought that a flunky on the Commission staff might be the effective boss of the academy, as the delegated branch--or--twig--officer at Headquarters.

Section 205(a) The actual cost of the program to a student might be very high if the idea is to include equipment amortization in the fee. I suggest that the last sentence be changed to "....equal to the operating cost to the Academy ....".

Section 206(d) I do not think it is commensurate with either the Academic Advisory Board's responsibility, dignity or effectiveness to have their advice subject to the approval of the Commission.

Section 207(a) You know better than I how much political necessity is served in setting up the Board of Visitors. Functionally, it appears to be a legislative oversight board. Are all those people really necessary?

Section 211(b) and (c) Heaven forbid that empire builders or venal people ever are involved with the Academy! However, just in case, shouldn't these items be required to be specifically authorized by the Congress?

University of Lowell
One University Avenue
Lowell, Massachusetts 01854
(617) 452-5000

June 13, 1985

Senator Daniel P. Moynihan
United States Senate
Washington, DC 20510

Dear Senator Moynihan:

Thank you for your letter of May 5, 1985, in which you ask for my comments on your proposal to provide standardized and comprehensive training for nuclear power plant personnel.

I tend to dislike the word "training" with reference to power plant personnel, and would perfer to see the word "education" (I have no trouble with "training" with reference to radiographers, for example, because I believe the required level of comprehension can be achieved in this industry by rote methods). Regardless, the key word in your proposal is "comprehensive"; if this means education in fundamental concepts in addition to training inspecifics, then I lend my wholehearted support.

My reaction to your proposal is, of course, colored by my experience. From the mid 1950's to 1970, I worked with Dr. H.J.C. Kouts at Brookhaven National Laboratory on critical experiments and reactor physics measurements. In these days, there was limited knowledge about the behavior of fissile systems, and so experiments were performed to study the characteristics of combinations of materials and conditions. The nature of this work was probably as chancy as anything that has been done in the industry, at least on an immediate vicinity basis (no large volume of fission products was generated, so the hazard was localized). For fifteen years or so, until the facilities were closed, this work went forth without any accidents, and without overexposure to personnel. All of the work was carried out under an organization of "responsible personnel", consisting of scientists and engineers with advanced degrees working, in early days, within the constraints of 8 "rules", each rule being one sentence, with the sum total of documentation covering about a half page. The system worked and worked well because 1) achieved scholarship and demonstrated comprehension of concepts was necessary to be considered as a "responsible person", and 2) demonstrated ability, personality, and integrity were necessary to be appointed as a "responsible person". Although the complexity and personnel needs of modern power reactors rule out return to such conditions, I believe the opposite trend toward rote training and a morass of paperwork is wrong; memorization of tens or hundreds of pages of special procedures, operating procedures, and emergency procedures cannot possibly lead to increased safety, but instead promotes automatonic and inane response.

In the same vein, we at the University of Lowell have been involved in "training" power plant personnel through manipulation of the controls of our research reactor under the auspices of our licensed operators. At first, the persons negotiating for this service did not want any lectures, but rather just experience on our console. Shortly after the first batch of trainees started working with our reactor, it became clear to me that they had had prior experience in what response to expect from a given manipulation, but that they really did not understand what was happening to give that response; I started giving a few talks and the supervisory people present decided to have the talks continued for subsequent trainees. These groups of trainees were well selected, far from dumb, and certainly able to understand fundamental concepts, but they needed exposure to the basic physics, to my mind illustrating the difference between education and training.

I have considerable admiration for the Institute of Nuclear Power Operations and the strides foreward they have made since TMI. In addition, INPO has been very helpful in the formal education field, funding scholarships and fellowships at undergraduate and graduate levels in nuclear engineering across the country, and, more specifically, at the University of Lowell. Nevertheless, I do believe that high qualilty uniform education is desireable for power personnel, and, of course, INPO only reviews individual programs for conformity to special standards rather than for uniformity. If uniform fundamental education is achieved, it will still be necessary to have plant-specific training in addition, as long as current differences in plants exist.

Your proposal would bring cohesiveness and uniformity of insturction, and should lead to high quality of education if handled properly. There is always the danger with centralized uniform education of inbreeding and complacency of teachers, which is less likely with decentralization because of rewards for innovative and individual ability, but I believe this drawback would be minimized by the review boards you propose. On balance, I see substantial reason for approval of your proposal, and I assure you of my support.

Sincerely yours,

James P. Phelps, Professor and
Coordinator,
Nuclear Engineering,
Mechanical and Energy Eng. Dept.

School of Mines & Metallurgy

UNIVERSITY OF MISSOURI-ROLLA

Nuclear Engineering Department
Rolla, Missouri 65401-0249
Telephone (314) 341-4720

June 5, 1985

The Honorable Senator Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

Thank you very much for soliciting my comments on the **National Nuclear Power Plant Personnel training Act of 1985** which you introduced in January 1985. I congratulate you for giving this matter the serious thought it deserves. However, I am not certain that this Act will accomplish what it intends to achieve.

There is no doubt that proper, comprehensive, intensive, and continuous training of nuclear power plant operators is necessary. I believe all the nuclear utilities recognized the problem after the TMI accident and changed their policies quickly after that event. As I am sure you are aware, the utilities have established the Institute of Nuclear Power Operations (INPO) located in Atlanta, GA with this objective in mind, namely Standardized (accredited if you will) training of operators. The work of INPO is not complete but has gone a long way already.

Guidelines have been set up for training, guidelines which although voluntary are followed to my knowledge by all nuclear utilities. INPO inspects thoroughly and accredits educational and training programs established by a utility. It is true that all the programs are not the same and the Act you introduced intends to remedy this "flaw", but is it really a flaw? I don't think so and here is why.

The training of nuclear power plant operators may be divided into two parts (a) generic and (b) plant-specific. The generic part consists of basic science and engineering courses that every operator should master before he or she attempts to conquer the second part which is plant - specific. It is this second segment - the most important probably - that a National Academy cannot teach. Plant-specific means just that: education, instructions, experience, finally licensing addressing all the constructional and operational details of a specific plant. As you know no two PWR's or BWR's are alike. The NRC licenses persons for a specific plant. How will a National Academy handle this problem? As I see it, a National Academy could address the generic aspects of operator training. But, this is exactly what INPO does. Why should one create a new Federal institution when an industry - created and supported organization (INPO) does the job? If you feel that INPO's standards are not adequate why not instruct the NRC to check them, voice an opinion, and have the standards changed? Don't you think such an approach would be simpler?

I could site other reasons against a National Academy for operator training like cost, another Federal boondogle etc. To do the job correctly cost should not be the issue; the Act is simple enough to avoid a huge new bureaucracy. No, these are minor problems. My main concern is the fact that a centrally located institution cannot address the plant - specific issues of training, therefore it cannot provide complete training, therefore why establish it?

Thank you very much for giving me the opportunity to comment. I would be glad to respond further if you feel it might be useful.

Sincerely,

N Tsoulfanidis

Nick Tsoulfanidis
Chairman,
Nuclear Engineering

Department of Nuclear Engineering

Rensselaer Polytechnic Institute Troy, New York 12180-3590

June 3, 1985

The Honorable Daniel Patrick Moynihan
United States Senate
Washington, D. C. 20510

Dear Senator Moynihan:

In accordance with your request, I have reviewed your bill entitled "National Nuclear Power Plant Personnel Training Act of 1985" In general, I think it is a very good bill and represents action which is long overdue. However, I have a few suggestions which you and your colleagues may wish to consider in your deliberations concerning this bill.

First of all, there is no reason in this day and age why we should place such high reliance on operators being able to act like computers in their response to normal and abnormal transients. Indeed, it is well within the state-of-the-art to use digital computer-based artificial intelligence algorithms (e.g., expert systems) to aid in the assessment of events, and to indicate to operators the appropriate action to take. In fact, there is no reason in principle why nuclear power plants cannot be run in a closed-loop fashion, with the operators having oversee responsibility for operations rather than having to manipulate every switch, dial and handle manually. That is, if our plants were run in a closed-loop fashion, as the CANDU reactors are in Canada, then they could concentrate on how the state of the plant is evolving during abnormal events and take appropriate action to override the closed-loop computer control if necessary. It is my opinion that it would rarely if ever be necessary to directly involve the operators; however, in any event, artificial intelligence (AI) algorithms could greatly aid the operator either in the open- or closed-loop mode.

It might surprise you that research concerning the use of A.I. for reactor operations is not already well underway by the U. S. Nuclear Regulatory Commission (USNRC). Unfortunately, if you look into the research branch of the USNRC, you will find it is headed by an individual who has absolutely no background in research and staffed by individuals, who, with few exceptions, have limited technical abilities and judgment. I believe that it is a generally held feeling by my university colleagues in Nuclear Engineering that the USNRC is not very interested in sponsoring innovative new research, and do not do so until it is forced upon them. Thus, in the past they have regularly turned down proposals for safety innovations such as the use of artificial intelligence in reactor operations and control. Hence, I would advise you to make the National Academy for Nuclear Power Safety as independent as possible from the USNRC, and urge you to staff it with "new blood" if at all possible.

I wish you good luck with your bill and would be happy to assist you in any way that I can. I have interface responsibility between both the Department of Energy and the USNRC with the Nuclear Engineering Department Heads Organization (NEDHO). This organization (NEDHO) is made up of all the department heads of the nuclear engineering programs throughout the nation. If you need our input or assistance, please let me know.

Sincerely yours,

R. T. Lahey

Dr. R. T. Lahey, Jr.
Chairman, Department of Nuclear Engineering

Department of Nuclear Engineering

Rensselaer Polytechnic Institute Troy, New York 12180-3590

June 24, 1985

The Honorable Daniel Patrick Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

The purpose of this letter is to transmit a copy of the testimony that I have given to Senator Simpson concerning your bill S-16. As you can see, I generally support the need for an academy devoted to nuclear power plant operations, however, I believe it should be oriented more towards operational technology development rather than operator training.

Once you have had an opportunity to review the material in my testimony, you may wish to discuss the subject matter at further length. If so, please contact me and I will be happy to meet with you and your staff. In addition, I would be interested in discussing the possibility with you of siting the proposed academy at RPI. As you may know, the nuclear engineering program at RPI is one of the strongest in the country. We are particularly reknown in the area of light water nuclear reactor technology and currently have active programs under way in the areas discussed in my testimony. Moreover, we are located in the heart of the Northeast where many of the nuclear plants are located, and have considerable experience in running interdisciplinary centers which involve both academia and industry. I have discussed the possibility of siting the academy at RPI with the Dean of Engineering and he has assured me that RPI would make suitable facilities available for this academy if it were decided to site it at RPI.

I look forward to hearing from you concerning this matter in the near future.

Sincerely yours,

R. T. Lahey

Dr. R. T. Lahey, Jr.
Chairman, Department of Nuclear Engineering

RTL/ev
Enclosure

cc: Paul DeRusso
Dwight Sangrey
Charles Richman

THE TESTIMONY OF DR. R. T. LAHEY, JR.

CONCERNING THE PROPOSED NUCLEAR POWER PLANT TRAINING ACT OF 1985 (S-16)

There is no doubt that more emphasis needs to be placed on nuclear power plant operations. Indeed, many of the recorded safety incidents and losses of plant availability/capacity are due to improper operator performance. It is my understanding that Senate bill S-16 is an attempt to improve this situation by establishing a national academy for operator training. This academy would presumably be modeled after operational training programs in the nuclear navy which have proven to be successful.

In my opinion, and in the opinion of many of my colleagues in academic circles, what is needed is not necessarily further training of operational personnel, but rather further education. Moreover, there is a need to radically change the way nuclear reactor operations are performed and the way operators are used. It should be pointed out that while naval nuclear programs have been successful for the purpose intended, naval propulsion power plants are much simpler and more compact than commercial nuclear power plants. In addition, it is standard practice in the navy to have a qualified watch officer oversee the performance of the operational personnel. While such a role model is possible in the commercial nuclear industry it is neither necessary nor desirable.

The current problems which we face in commercial nuclear power plant operations are complicated and need some explanation. First of all, the existing operators definitely need further training and education in order to enhance their abilities to properly run nuclear power plants. I personally believe this can best be done by government cooperation with, and encouragement of, the programs underway by the Institute of Nuclear Power Plant

Operations (INPO). It is clear that such efforts by industry have already begun to pay dividends, and there is no doubt in my mind that they will continue to improve the situation in the near future. In fact, the only weakness which I see in the INPO programs is that they have not emphasized the education of operators as heavily as they should (and could). Indeed, they should involve university educators more heavily in the development of the content of the course material which the operators are required to demonstrate proficiency in.

The training and further education of the existing operators is obviously important but can be accomplished through existing organizations. However, I believe that this program alone represents nothing more than a band-aid to a situation that requires a more extensive fix. The basic problem is that very few nuclear engineering graduates go into power plant operations, and that the existing operators are normally not college graduates. As a consequence, the current level of technical understanding of operational personnel is considerably less than it should be.

The reason that degreed nuclear engineers have not gone into operations in the past is that such jobs have been viewed as a "dead end" career path. That is, the utilities have generally not viewed operations as a viable training ground for engineers who would later go on to hold higher level engineering positions within their organizations. While this is beginning to change, more incentive needs to be established by the utilities to encourage nuclear engineering graduates to go into operations; at least in the early stages of their career. The truth is that field work, such as operations, represents an extremely interesting and challenging experience for a new college graduate. As a consequence, I believe that many of our college graduates would go into operations if they were assured that the experience that they would gain would be valuable to them in their future careers with the utility. While this is not an area that the government should be directly involved in, it can certainly help by encouraging the utilities to increasingly utilize engineering graduates in their operational programs.

One of the reasons that the utilities have been hesitant to get engineers heavily involved into the operations area is that the degree of training required to operate a modern nuclear power plant is extremely high. Thus they have not been eager to train people who would subsequently move into other positions within the company. Instead, it is clear that many of them prefer to train less educated operators who will spend much of their career in the area of operations. I believe that this has come about because of the way that commercial nuclear power plants are operated, and in fact, it is indicative of the need for a fundamental change in the way nuclear power plants are operated.

What is really needed in this country is not an academy for nuclear power plant operator training, but the establishment of an academy for nuclear power plant operation technology development. By that I mean the establishment of an organization whose responsibility it is to develop technology which will improve the way nuclear power plants are operated. There is no doubt that artificial intelligence (AI) techniques, such as expert systems, can be developed to greatly improve the way of commercial nuclear power plants are operated. We need a concerted interdisciplinary R&D effort in the area of nuclear power plant operations to bring this technology to the point of industrialization. What I have in mind is the development of digital computer based algorithms which can be used for either open- or closed-loop control of nuclear power plants. The technology exists to do this, indeed our neighbors in Canada have been running their CANDU reactors in a closed loop mode for many years. The introduction of state-of-the-art computer hardware and artificial intelligence based control schemes into reactor operations should dramatically improve the safety and availability of our nuclear power plants. Moreover, it will elevate the operator to the role of a plant manager, with monitoring and over-ride responsibilities, rather than someone who scurries around answering all the enunciators that go off during abnormal events. Indeed, with such a control system, the use of nuclear engineers in operations would be quite appropriate.

It has been said that the perfect nuclear power plant operator would have the brain of an elephant, the body of an octopus and the reflexes of a mongoose. Clearly there are some operators that possess many of these qualities, however it is unrealistic to expect that all of them will. Moreover, these type of capabilities can easily be encoded into a digital computer such that great operational standardization could occur. Moreover, in my 25 years of nuclear reactor safety experience I have never seen a better opportunity to improve plant safety than by the use of computer control.

I believe that the proper role for the academy which bill S-16 proposes would be one which is concerned with the development of this new operational technology. Not only would such technology address many of the utility's economic concerns about having a flow-through of nuclear engineers in their operational programs, but it would also assure a very high standard of operations at virtually all nuclear power plants in this country. I believe the final result would be nuclear power plants that utilize the best technology that we have available and staffed by motivated and knowledgeable college trained personnel in the control room.

Unfortunately, I believe that an upgrading of operational practices in this country will not rapidly occur unless the federal government takes the initiative. As a consequence, I believe your proposal for the establishment of an academy is both timely and important, particularly if it emphasizes the approach which I outlined above. I recognize that this testimony has been brief and would be very happy to discuss my proposal at more length with this committee at their convenience.

Dr. R. T. Lahey, Jr.
Chairman, Department of Nuclear Engineering
Rensselaer Polytechnic Institute
Troy, New York 12180-3590
June 27, 1985

THE UNIVERSITY OF TENNESSEE
KNOXVILLE, TENNESSEE 37996-2300

DEPARTMENT OF NUCLEAR ENGINEERING
NUCLEAR ENGINEERING BUILDING
TELEPHONE (615) 974-2525

May 29, 1985

Honorable Senator Daniel Moynihan
United State Senate
Washington, D.C. 20510

Dear Senator Moynihan:

I appreciate the opportunity to comment on your proposal of the National Power Plant Personnel Training Act of 1985 (S.16). A member of Senator Sassers staff had sent me a copy so I have had an opportunity to study your proposal. I believe that I can develop comments that are not of a self serving nature. As a member of the nuclear engineering education community, I have not attempted to develop a program to train operators, technicians, or other skilled labor. We have developed a good program to educate nuclear engineers.

I will approach the analysis of your legislation by first determining if you have made a good case for the legislation and then to determine if the apparent problems will be solved.

You have cited several reasons for promoting the Institute -- few of which impress me. You state, "We have simply taken the old standards and practices developed for coal fired power plants, and applied them to the workplace for nuclear reactors". This is not a good or true statement, but if it were I would be the first to support your proposal.

The observation "that human error is involved in 38% of all events at nuclear power plants that could lead to significant accidents" gives little information since it does not tell me of the number of events. I would like to see information on the probability of a significant accident being caused by human error. The accident at Three Mile Island was certainly promoted by human error (caused by poor operator training), yet the problems caused by the fire at Browns Ferry were mitigated by appropriate actions taken by the operators. One must assume good training in this case. There are differences in training programs (as recognized by the NRC) and these differences are now being analysed by INPO.

What has been the success of the Federal Academies of fire protection and mine safety? I am not familar witn these academies but we certainly have not eliminated mine accidents caused by human error. Mine accidents continue and so will reactor accidents. Do the Federal Academies really make a case for the Institute?

I am a great admirer of the program developed by Adm. Rickover. However there are many differences between his program and the civilian power program. Training encompasses only a small part of the differences. One of the significant differences is associated with the systems that are used in the two programs. The Navy program uses one reactor type and training can be very precise and concentrated. The civilian power program has many different types of reactors and any Institute would need to develop plant specific programs -- a very inefficient way to operate. Parenthically it should be noted that reactor operators are now examined and licensed for a specific plant. They do not receive a generic license to operate any nuclear plant.

A better job can and must be done in the field of training and education. However I do not believe that the establishment of an Institute is the appropriate way to accomplish your goal of providing our society with a safer nuclear industry. Existing programs for training nuclear power plant personnel lack uniformity and often are not consistent with accepted practices. Some are, so why not force others to follow the good practices rather than forming an Institute. Please recognize that human error will never be eliminated, not even with a system similar to Adm. Rickover's. If you want to eliminate a majority of the human operational error take the human out of the operation. Let a computer do the job. The space program does so, why not the nuclear program?

As you have probably determined, I am not satisfied that the establishment of an Institute will cure nuclear operational problems. We have programs in existence, which if used properly, will go a long way in satisfying our goals of having a safer nuclear industry.

If I can be of other service, please call on me.

Sincerely,

P. F. Pasqua, Head
Nuclear Engineering
Department

TEXAS A&M UNIVERSITY
COLLEGE OF ENGINEERING
COLLEGE STATION, TEXAS 77843-3133

DEPARTMENT OF NUCLEAR ENGINEERING
(409) 845-4161

31 May 85

Daniel Patrick Moynihan
United States Senate
Washington, DC 20510

Dear Senator Moynihan:

Thank you for including me on the distribution list for your mailing of 6 May 85. Your proposal to establish a National Academy for Nuclear Power Safety is very interesting and one which may offer the several advantages which you outlined. I will be giving the matter more thought over the next several weeks and will respond with a more considered reply; however, I wanted to provide some immediate reactions.

It is imperative that the Academy would be of high quality and effectiveness to meet the desired goals. It is likely that a single centralized academy may not be the optimum format. Because of its very significant influence within the nuclear industry, the Academy would be subject to politicization, and the programs which are used in training would be constantly open to question among the participating utilities. Moreover, since existing plants vary so much in design, standardized training may not be uniformly effective.

There is one other aspect of a centralized academy which should be considered: the difficulty of finding people who are willing to go to such a training center for extensive periods of time. It is one thing to have a Navy program in which enlisted men can be assigned to a training program. It may be another matter for utilities across the country (competing with other industries) to recruit personnel and then require that they spend extended periods of time at some location away from their home and workplace. I fear that the immediate result of this centralized training would be to drive many people out of the nuclear area and into less demanding professions. It is already difficult to attract people of high quality to the nuclear industry.

Rather than a single centralized center, it might be more attractive to utilize regional training centers located in several different places throughout the U.S. In the not-too-distant past Texas A&M proposed such a center, but was unable to get local utilities to go along with its establishment. Our objectives at that time were similar to the goals you outlined in your letter.

I will, as stated above, try to give you a more comprehensive and considered reply to your letter in the near future. I hope these comments are helpful. Note, for your information I am enclosing a copy of the latest INFO Review magazine. It addresses some topics of interest to you.

Yours truly,

Carl A. Erdman

Carl A. Erdman
Professor and Head

AMERICAN NUCLEAR ENERGY COUNCIL
410 FIRST STREET, SE • WASHINGTON, DC 20003
(202) 484-2670

EDWARD M. DAVIS
PRESIDENT

June 24, 1985

Honorable Daniel Patrick Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

This week the Senate Environment and Public Works Subcommittee on Nuclear Regulation is scheduled to hold hearings on S. 16, a bill that you have introduced to establish a national academy for the training of nuclear power plant personnel. The nuclear energy industry is pleased to have been invited to testify at this hearing and will be prepared to offer specific comments on S. 16. Previously, you had written to the American Nuclear Energy Council (ANEC) requesting comments on S. 16. In this regard, I am enclosing for your information the ANEC position paper on S. 16. In addition, I am also enclosing a brochure which briefly describes the industry training program.

In general, we believe that major improvements in the training of nuclear power plant personnel have been made, and are continuing to be made, through industry sponsored and initiated self-improvement programs. The establishment of the Institute of Nuclear Power Operations (INPO) by the electric utility industry has resulted in major improvements in all aspects of nuclear power plant operations, particularly in the area of training of nuclear power plant personnel. The industry is dedicated and is striving to achieve standards of excellence in all aspects of nuclear power operations. Major steps have been taken industry-wide to improve training, including the addition of multi-million dollar simulators located at plant sites, as well as many other new training facilities. Quantifiable examples of industry-wide improvements in the training of nuclear power plant personnel include:

- An increase from 10 to 70 in the number of nuclear power plant simulators available for training at plant sites (10 were in use in 1979, 44 are currently in use, and 26 others are scheduled or committed to be built). These simulators are plant-specific in design and are located in close proximity to nuclear power plant sites.

- The average number of full-time utility training personnel per plant has increased by nearly 400 percent, and those training personnel who hold or have held NRC operator or senior operator licenses has increased by nearly 200 percent.

- Many new training facilities have been constructed. The industry-wide floor space dedicated to training has increased by over 250 percent since 1979.

- An increase of from four to five or six shifts of operating personnel at each station since 1979. This allows one full shift of operators to be dedicated to training activities.

- A steady decline in the number of unplanned power plant shutdowns (reactor scrams), from six scrams per plant per year in 1980 to 3.5 scrams per year in 1984. This downtrend is largely attributable to improvements in training and operating philosophy, and only to a much lesser extent to equipment changes.

- Forty-one training programs at nine utilities have been awarded accreditation by an independent accrediting board, under the auspices of the INPO accrediting program as of March 25, 1985. All operating utilities have committed to having all of their training programs ready for accreditation by the end of 1986.

The above mentioned examples are just a few of the many improvements that individual utilities have accomplished in the way of enhancing the safety of nuclear power plant operations.

As a result of these industry-wide efforts, the industry has strong reservations as to whether S. 16, as presently drafted, would result in significant improvements in the training of nuclear power plant personnel beyond those improvements already achieved and underway through industry-sponsored programs.

I believe the hearings on S. 16 will provide the Subcommittee an opportunity to learn first-hand of the results being achieved through industry self-improvement programs. As a consequence, I am hopeful that the Subcommittee will be in a better position to judge the merits of S. 16 and other proposals in the area of training of nuclear power plant personnel.

Thank you for the opportunity to comment on S. 16. Please call on the Council if we can be of any further assistance.

Sincerely yours,

Ed Davis

Edward M. Davis

Atomic Industrial Forum, Inc
7101 Wisconsin Avenue
Bethesda MD 20814 4805
Telephone (301) 654 9260
TWX [illegible] ATOMIC FOR DC

Carl Walske
President

June 20, 1985

The Honorable Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

This is in response to your letter of May 6, 1985, in which you requested comments on the bill you introduced January 3, 1985, the National Nuclear Power Plant Personnel Training Act of 1985 (S.16).

It is of course unquestioned that the education, training, and qualification of nuclear power plant personnel be of the highest caliber. The role of the operators, technicians, and engineers is crucial to the safe and reliable operation of these plants. The nuclear power community has understood this since the earliest days of nuclear power. Qualification systems and training programs were developed early on in the commercialization of nuclear power drawing heavily on the Navy's nuclear training programs for operators. The accident at Three Mile Island as it turned out was a watershed for all concerned with nuclear power: industry, the regulators, congressional oversight and the intervenors. The industry, for its part recognized the interdependence of the operations of nuclear power plants. If one plant has problems it can have a significant impact on all operating plants. To apply the highest standards of training and operational excellence to each plant was the industry goal.

Introducing the concept of an Academy appeared to meet these objectives. However, because of the diversity of plant designs, distances involved for personnel to travel, the problems with recruiting and selection of personnel, family hardships, duplication of effort with utility training programs, and the need for training to be a continuous process, the concept of the Institute of Nuclear Power Operations (INPO) was born. INPO was then established by the utilities to achieve excellence in all facets of nuclear plant operations including training and education.

The need for collective industry action, peer pressure, and the desire for excellence has made INPO a success. The industry has devoted significant resources to INPO and it has grown greatly in stature and credibility over the past five years. Much of that success is due to the leadership, experience and intellect of its first president, Vice Admiral Eugene P. Wilkinson, USN(Ret) who brought to the job a philosophy of excellence that is attributed to the highly successful U.S. Navy nuclear power program.

With the renewed emphasis on training and upgrading of nuclear plant operations since the TMI-2 accident, much has been accomplished. The licensees have devoted significant resources to upgrading their training facilities and programs. Plant specific simulators have been or are being installed at most of the plant sites. Other improvements in curriculum, instructors, classrooms, equipment mockups, and high tech instructional aids have been or are being installed. All of this is being done in conjunction with the assistance of INPO's job and task analysis and training accreditation programs.

There has truly been dramatic progress in the training and qualification programs at America's nuclear power plants. We believe that the utilities' commitments to excellence and specific commitments for accrediting their training programs are the best means for obtaining and maintaining the high level of training and qualification that nuclear power demands. Therefore, considering the licensees' efforts and commitments, backed up by the assistance, evaluation, and follow-up of INPO there is no need for a National Academy for Nuclear Power Safety. This also was the conclusion of the DOE "Study of A Federal Nuclear Operations Corps" which was published in December 1981. We believe actions by the utilities and INPO since that time have strengthened that conclusion.

You should have already received a Position Paper on your bill which was prepared by the American Nuclear Energy Council (ANEC). We fully support this industry position.

I thank you for requesting my comments on this important issue.

Sincerely,

Carl Walske

DOUB AND MUNTZING
CHARTERED
ATTORNEYS AT LAW
INTERNATIONAL SQUARE
1875 EYE STREET, N.W.
WASHINGTON, D. C. 20006

WILLIAM O. DOUB
J. MANNING MUNTZING
PERRY R. SEIFFERT
ROBERT J. ROSS
JAMES A. GLASGOW
JAMES R. SHOEMAKER
JOANNE C. RYROS
JOSEPH H. CHIVERS

TELEPHONE (202) [illegible]
TELEX [illegible]
TELECOPIER (202) [illegible]
CABLE ENERAG

COUNSEL
CRAIG HOSMER
(1915-1982)

June 19, 1985

The Honorable Daniel Patrick Moynihan
Room 464
Senate Russell Office Building
Washington, D.C. 20510

Dear Senator Moynihan:

You have requested my comments on the National Nuclear Power Plant Personnel Training Act of 1985, S.16, introduced by you on January 3, 1985. I am pleased to respond to your request.

The United States, as the pioneer in the development of peaceful nuclear uses, has the largest nuclear power program in the world and will have for the foreseeable future. The number of people required to operate this program is large, and their competence to do so is important to public health and safety. Thus, as your bill indicates, education and training as well as continued education and training programs are essential. The key issue is how can this best be achieved and who should have the responsibility.

Under the laws of this country the day-to-day responsibility for the safe operation of nuclear facilities rests with the licensees. It is their responsibility to have a commitment to safety, a dedication to quality that produces safety, and a cadre of technicians who are trained and motivated to fulfill this responsibility. The Nuclear Regulatory Commission must establish standards and regulations, review industry proposals, inspect compliance, and take enforcement and corrective actions where necessary.

From my perspective as the Director of Regulation for the Atomic Energy Commission in the early 1970s, the concept of an independent government body representing the public interest and overseeing the activities of the operating licensees is a sound approach to achieving acceptable levels of health and safety. From this, I believe that the Nuclear Regulatory Commission should not have operational responsibilities in the education and training of personnel. Instead, it should be the Commission's responsibility to set standards and oversee their implementation. Otherwise, they are no longer the independent evaluator of the activities but become part of the operations.

Therefore, I conclude that the Nuclear Regulatory Commission should not establish a training academy but should continue its role as a regulator. The regulation of nuclear technicians occurs today with the Nuclear Regulatory Commission setting requirements for nuclear operators. If there is a deficiency in the system, the Nuclear Regulatory Commission should insist that it be corrected. At the moment, the primary obligation resides with the licensees to have adequately educated and trained employees. Their programs are evaluated by the National Nuclear Accrediting Board as well as by the Institute of Nuclear Power Operations. In addition, the Nuclear Utility Management and Human Resources Committee was established by industry in 1984 to improve management and people-related areas of nuclear plant operations, including training. A two-year trial period is underway so that we should see the results some time in 1986.

It is quite possible that the best, most efficient, and quickest way to enhance nuclear education and training is to use the existing institutions, namely industry efforts regulated by the Nuclear Regulatory Commission. The Congressional hearings scheduled for June 26, 1985, on this subject could serve as a catalyst to encourage a new analysis to assure that, in fact, appropriate education and training steps are being, or will be, pursued by the existing institutions. If an appropriate response fails to materialize, alternatives then could be considered to achieve the desired results. For instance, the Department of Energy or a government authorized corporation might undertake the establishment of a national training academy or a program designed to enhance nuclear power plant education and training.

I hope these comments are helpful to you, and I am pleased to respond to your request.

Very sincerely,

L. Manning Muntzing

EDISON ELECTRIC
INSTITUTE

1985 JUN 10 PM 1:04

June 6, 1985

The Honorable Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

SUBJECT: National Nuclear Powerplant Personnel
Training Act of 1985 (S.16)

Dear Senator Moynihan:

We are pleased to offer the following thoughts in response to your request for comments on S.16. The industry recognizes the importance of and the role of training in the development of well-qualified and skilled nuclear powerplant personnel, and supports the principles and objectives that are the basis for your proposed legislation, S.16. Industry initiatives and activities over the last several years clearly indicate that progress is being made in this regard.

Each individual utility is responsible for establishing ongoing comprehensive and systematic training programs to develop highly qualified, well-trained personnel. In recognition of the importance of this area, the industry has established, under the Institute of Nuclear Power Operations (INPO), an accreditation program to evaluate and accredit individual utility training programs. This program is supported fully by our industry and INPO informs the Nuclear Regulatory Commission on its progress. NRC nominates persons for membership on the independent accrediting board. Also, the NRC examines each candidate for operator and senior operator positions (oral, written and simulator), as one element of fulfilling its responsibilities, and evaluates in detail the effectiveness of training through on-site inspections and audits.

Furthermore, benchmarks of excellence, rather than regulatory limits are defined by the industry and used as primary motivating forces in the development of the operating staffs at nuclear plants to achieve the performance level appropriate for our industry. While there are generic training courses that are required by all personnel who operate the facilities, because of diverse plant designs, locations and technical specifications, a significant amount of the initial training and essentially all of the retraining is best achieved at the specific reactor location, or at the location of an appropriate plant simulator. In considering the relatively large number of persons to be trained and the rotating shift scheduling practiced at all nuclear facilities, bringing the trainers to the trainees appears to be more efficient and effective than sending plant personnel to a distant institution or an academy which is unable to provide the plant-specific training, an essential element in any comprehensive training program.

In evaluating the concept of establishing a National Academy to train powerplant operators, many considerations must be addressed. Several aspects of the present training programs could be impacted by such a change. Some form of an academy may provide certain generic instruction, particularly classroom-like instruction, or other specialized essential elements of a comprehensive training program. However, much of the expertise in nuclear energy plant operations resides in the nuclear utility industry itself. The talent required to provide the training functions envisioned in your bill, S.16, would most likely be drawn from the existing pool of trained utility personnel. Another significant element of such a program is the difficulty associated with an attempt to consolidate the ongoing training initiatives at any single location. Of concern is the establishment of an academy at a precise location that could result in a major disruption of ongoing utility training initiatives. Another consideration is how to use effectively the extensive training facilities and apparatus already existing and operational, and also keep pace with the training requirements of our industry.

As indicated, we have reservations about S.16 as presently drafted. The industry is willing to consider all alternatives that provide improvements to the current industry self-improvement operator training programs. Perhaps with a better understanding, by all parties, of the industry programs that are in place, the principles and objectives of your proposed legislation can be satisfied with alternative arrangements.

Sincerely yours,

William McCollam, Jr.

William McCollam, Jr.

NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Berlin, Connecticut
P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

WILLIAM B. ELLIS
CHAIRMAN AND CHIEF EXECUTIVE OFFICER

June 14, 1985

The Honorable Daniel P. Moynihan
United States Senate
Washington, D.C. 20510

Dear Senator Moynihan:

Thank you for your letter of May 10, 1985 in which you requested comments on the proposed National Nuclear Power Plant Personnel Training Act of 1985 (S.16).

We strongly agree that the skills and competence of the operating staff are critical factors in the safety of nuclear power plant operations. Experience has shown us that human error, whether on the part of operations, surveillance or maintenance, can be a key contributor to both plant safety and reliability. Thus, the competence of the individuals performing these functions is very significant in ensuring protection of the health and safety of the general public and of plant personnel and in minimizing the financial risk to the utility. For these reasons, we also believe that high standards in the training and discipline of licensed operators and other individuals whose job performance could directly affect nuclear safety are both a minimum and necessary objective of the nuclear industry.

Northeast Utilities (NU), as operator of the Haddam Neck Plant and Millstone Units 1 and 2 and operating license applicant for Millstone Unit 3, is firmly committed to a strong emphasis on training and qualifications of our nuclear plant staffs, and to high (and rising) standards. For this reason, NU has established a nuclear training organization which reports directly to the functional Vice President, with the responsibility for providing centralized and consistent training not only to our licensed operating staffs, but also to nonlicensed plant operators and other plant staff (e.g., health physics, chemistry, emergency planning) and to our Corporate Nuclear Engineering and Operations personnel. We have also undertaken a variety of other initiatives related to improving operator training and qualifications, some of which are described below. This level of commitment is essential to fulfilling our responsibilities to our customers and the general public.

We believe, however, that a national academy is neither necessary nor desirable to achieve the objectives of the proposed National Nuclear Power Training Act of 1985. Rather, we believe that the various initiatives that have been undertaken, either by individual utilities or by the industry as a whole, collectively provide a higher level of assurance that qualified and adequately trained personnel are available to safely operate civilian nuclear power plants, than would result from the proposed National Academy for Nuclear Power Safety. These initiatives are designed not only to improve the training and qualifications of the plant staffs, but also to assist the operator in understanding and responding to plant conditions in a correct manner. These initiatives include:

- The industry, through the Institute for Nuclear Power Operations (INPO), has established a comprehensive, nationwide accreditation program. This program provides for upgrading of the training programs for all licensed operators as well as the training for other key positions that can directly affect operations. The scope of the accreditation effort presently includes 10 key nuclear plant positions. An independent accrediting board reviews each program evaluation. Licensees are expected to have these training programs ready for accreditation by the end of 1986. This industry-wide accreditation process will ensure a level of consistency and compliance with uniform training criteria.

- NU, and many other licensees, are utilizing plant simulators as an integral part of their training programs. Two photographs of our recently completed Millstone Unit 3 simulator are attached. At present, 44 simulators are in use, and a total of 70 simulators are now in operation or are planned. The use of simulators provides more comprehensive training for the operators and allows them to experience transients and accidents (in addition to normal plant maneuvers) in a training environment that would otherwise not be possible. These simulators are plant-specific in design, are located in proximity to the plants, and permit training and evaluation of both individuals and the entire shift crew.

- Over the past 5 years, utility training staffs were significantly enlarged in recognition of the importance of training and requalification to the effectiveness and capabilities of the operating staff. The number of full-time personnel per plant who are dedicated solely to training increased by approximately 375% nationwide between 1979 and 1984. Additionally, utilities have made substantial improvements in the size and quality of training facilities.

- NU recognizes the importance of professionalism for our key operations personnel, a concept which you referred to as the "sociology of the workplace." In addition to the various upgrades and programs discussed elsewhere in this letter, we currently have under evaluation the introduction of a dress code for control room personnel at all of our nuclear facilities. We are attempting to improve the professional image of these key individuals without dictating use of a "uniform," which could be detrimental to spirit and morale.

In addition to the above, significant improvements have been effected in the man-machine interface. Licensees are performing human factors engineering evaluations of their control rooms. New safety-related instrumentation has been added to these plants along with display systems to present vital plant status information in a concise, centralized and timely manner. Licensees are in the process of implementing new symptom-based emergency operating procedures based on generic procedure guidelines developed by the various nuclear steam supply system vendors. At our Millstone Unit 1, these new procedures have been in use for approximately 2 years with favorable results. All of these efforts will produce positive effects on operator qualifications and performance.

It is the first item identified above which we believe responds most directly to the concerns you have expressed regarding the adequacy of operator training programs. All 55 domestic nuclear utilities have committed to the accreditation of their training programs for 10 key positions, including all licensed operators. These training programs will be reviewed to guidelines developed by INPO for each position. The skills and knowledge for each position are determined from a job and task analysis, to ensure that the learning objectives are derived from the desired performance after training. Additionally, the training programs are reevaluated and revised as necessary based on the performance of trained personnel in the job setting.

As a benchmark for judging the results of these efforts, we note that there has been a steady decline in the number of unplanned nuclear power plant shutdowns. Between 1980 and 1984, the average number of shutdowns per unit (with the generator synchronized with the grid) for the industry decreased from approximately 6 per year in 1980 to approximately 3.5 per year in 1984. On our own 3 operating units, the average number of automatic reactor shutdowns per unit decreased from approximately 4.5 in 1980 to less than 1 per unit during 1984. This downward trend is attributed in large measure to improvements in training and operating philosophy. Additionally, during 1984 two of our units established new records for continuous time on-line, including a 417 day run by Haddam Neck, which was a world record at the time. Our third unit, Millstone Unit 1, has been operating continuously for over 310 days which is also a new record for that unit.

There are also several reasons why we believe that a national academy, if it were formed, could not achieve the desired results as efficiently as will the current approach to training. These include:

- Diversity in plant design, operating procedures, transient response, and Technical Specifications require that a significant amount of initial training, and essentially all periodic retraining, be accomplished at the individual plants. This facility-specific in-plant training is absolutely essential for a well qualified operator. As noted above, simulators play a vital role in training, and these are located at the plant sites. The inefficiency and inherent lack of consistency of having a centralized academy with a "branch office" for every different power plant should be apparent.

- While there are certain training courses that could be implemented through a centralized academy, the sheer numbers of utility personnel who will require this training suggest that it would be most efficient to bring the trainers to the trainees, rather than vice versa. Again, this supports the concept of individual utility-run programs which meet uniform accreditation criteria.

- There is little nuclear power plant operating experience outside of the military and the utility industry. Specifically, the NRC and universities do not have the plant operating expertise necessary to accomplish the objectives of the proposed academy.

- Numerous organizations have reviewed the issue of training of nuclear power plant personnel and concluded either that a federally run training academy is not advisable, or that industry sponsored self-improvement efforts, such as those being implemented through INPO, are appropriate. These organizations include the President's Commission on the Accident at Three Mile Island (Kemeny Commission), President Carter's Nuclear

Safety Oversight Committee, the INPO Regional Training Center Task Force, and the Department of Energy.

- Organizing and mobilizing a national academy represents a very substantial undertaking, one which would pose numerous logistical challenges. The training and work rotation schedules for dozens of key individuals at each of approximately 100 nuclear stations would need to be coordinated through the academy.
- The NRC must be independent from licensee operations. While the NRC does not now direct the operator training program, it is not prohibited from evaluating a licensee's training program in any manner. The agency's flexibility and independence in that relationship is considered healthy. Placing responsibility for standards and execution of the training program with the NRC could erode that independence. It is the licensee who has the ultimate responsibility for nuclear plant safety, and likewise it is the licensee who should be responsible for staffing the facility with qualified individuals. The proposed academy could blur that responsibility and possibly dilute the licensees responsibility to pursue excellence in training.

The NRC, the nuclear utilities, and numerous other organizations have highlighted the need for increased emphasis on operator qualifications and the man-machine interface. Dramatic improvements have been made in these areas during the last five years, and further upgrades are currently in progress. It is noteworthy that the NRC had contemplated promulgation of a large volume of regulations in response to Section 306 of the Nuclear Waste Policy Act, and ultimately withheld publication of these rules to allow the industry to continue with what we view to be a superior alternative, namely striving for excellence via the INPO accreditation process and related initiatives. Substantial resources have been invested towards our current self-improvement approach; the proposed national academy would disrupt our ongoing programs to the detriment of our mutual objectives. We view the current industry commitment coupled with continuing NRC oversight and potential new innovations, such as the use of an additional Systematic Assessment of Licensee Performance (SALP) evaluation category on training, to represent the optimum approach.

In summary, we strongly support the principles and objectives that formed the basis for the proposed National Nuclear Power Plant Personnel Training Act of 1985, however we believe that a National Academy for Nuclear Power Safety is neither necessary for nor capable of meeting those objectives. Rather, the efforts currently underway by the industry, INPO, and individual utilities including NU are responsive to your concerns and provide assurance that nuclear power plants are staffed by competent and qualified individuals.

We appreciate the opportunity to comment to you directly on the proposed National Nuclear Power Plant Personnel Training Act of 1985, and we remain available to discuss this further should you so desire.

Very truly yours,

William B. Ellis

W. B. Ellis
Chairman and Chief Executive Officer

○